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SIR WILLIAM PETTY.

CHAPTER I.

MATERIALS FOR PETTY'S BIOGRAPHY: THE WILL, AND AUBREY'S LIFE OF PETTY.

PETTY'S WILL.

Petty's will, dated May 2, 1685, printed in the Dublin collection (1769) of his writings, gives the following autobiographical data:

“In the first place I declare and affirm that at the full age of fifteen years I had obtained the Latin, Greek and French tongues, the whole body of common arithmetick, the practical geometry and astronomy, conducing to navigation; dialling, &c. with the knowledge of several mathematical trades, all which, and having been at the University of Caen,¹ preferred me for the King's Navy, where at the age of twenty years I had gotten up about three-score pounds, with as much mathematicks as any of my age was known to have had.

“With this provision, anno 1643, when the civil wars betwixt the King and Parliament grew hot, I went into the Netherlands and France for three years, and having vigorously followed my studies, especially that of medicine, at Utrecht, Leyden, Amsterdam, and Paris, I returned to Rumsey, where I was born, bringing back with me my brother Anthony, whom I had bred, with about ten pounds

more than I had carried out of England. With this seventy pounds, and my endeavours, in less than four years more I obtained my degree of M. D. in Oxford,² and forthwith thereupon, to be admitted into the College of Physicians, London, and into several clubs of the virtuous;³ after all which expences defrayed I I had left twenty-eight pounds, and in the next two years, being made Fellow of Brasenose⁴ and Anatomy Professor in Oxford and also Reader at Gresham College, I advanced my said stock to about £400, and with £100 more advanced and given me to go for Ireland, unto full £500. Upon the 10th of September, 1652, I landed at Waterford in Ireland, physician to the army, who had suppressed the rebellion begun in 1641, and to the general of the same, and the headquarters, at the rate of twenty shillings per diem, at which I continued till June, 1659.” Here follows an account of his public career in Ireland, more fully related in his other works. He estimates his profits at £13,000. “I bestowed part of the said £13,000 in soldiers debentures, part in purchasing the Earl of Arundel’s house and garden in Lothbury, London, and part I keep in cash to answer emergencies. I purchased lands in Ireland, . . . a great part whereof I lost by the Court of Innocents, anno 1663, and built the said garden called Token House Yard in Lothbury, which was for the most part destroyed by the dreadful fire, anno 1666. Afterwards, anno 1667, I married Elizabeth, the relict of Sir Maurice Fenton, Bart. I set up iron works and pilchard fishing in Kerry, and opened the lead mines and timber trade there.” Here follow detailed accounts of his investments by all of which he estimates that he has an income of £15,000. “As for myself, I being now three-score and two

years old, I intend to attend the improvement of my lands in Ireland, and to get in the many debts owing unto me, and to promote the trade of iron, lead, marble, fish and timber whereof my estate is capable: and as for studies and experiments, I think now to confine the same to the anatomy of the people and political arithmetic, as also to the improvement of ships, land carriages, guns and pumps, as of most use to mankind, not blaming the studies of other men. As for religion, I die in the profession of that faith, and in the practice of such worship as I find established by the law of my country.”

AUBREY'S BIOGRAPHY OF PETTY.

The following life of Petty is printed in “Letters of Eminent Persons,” by J. Aubrey, London, 1813, volume II., pages 481–491:

Sir William Petty was the son of ——— Petty,⁵ of Rumsey, in Hampshire, by ———, his wife. His father was born on the Ash Wednesday before Mr. Hobbes, *sc.* 1587. He was by profession a clothier, and also did dye his own clothes. He died and was buried at Rumsey 1644, where Sir William intends to set up a monument for him. He (Sir William) was born at his father's house, aforesaid, on Monday, the twenty-sixth of May, 1623, eleven hours 42' 56" afternoon. Christened Trinity Sunday.⁶

Rumsey is a little haven town, and hath most kinds of artificers in it. When he was a boy his greatest delight was to be looking on the artificers, smyths, watchmakers, carpenters, joiners, and at twelve years old he could have worked at any of these trades. Here he went to school, and learned by twelve years a competent smattering of Latin, and was entered

into the Greek before he was fifteen. He has told me there happened to him the most remarkable accident of his life (which he did not tell me), and which was the foundation of all the rest of his greatness and acquiring riches. He informed me that about fifteen, in March, he went over to Caen, in Normandy, in a vessel that went hence, with stock, and began to play the merchant, and had so good a success that he maintained himself and also educated himself. This, I guess, was that most remarkable accident that he meant. Here he learned the French tongue and perfected himself in Latin, and had Greek enough to serve his turn. At Caen he studied the arts. At eighteen he was, I have heard him say, a better mathematician than he is now. But when occasion is he knows how to recur to more mathematical knowledge. At Paris he studied anatomy; and read Vesalius with Mr. Hobbes, who loved his company. Mr. Hobbes then wrote his "Optics." Sir William Petty then had a fine hand in drawing, and drew Mr. Hobbes' optical schemes for him, which he was pleased to like. At Paris, one time, it happened that he was driven to a great straight for money, and I have heard him say that he lived a week on two pennyworth (or three, I have forgot which, but I should think the first) of walnuts. Query: whether he was not some time a prisoner there.⁷ Anno Domini 1644 he came to Oxford⁸ and entered himself of Brasenose College. Here he taught anatomy to the young scholars. Anatomy was then but little understood by the university, and I remember he kept a body that he brought by water from Reading a good while to read on, some way preserved or pickled. Anno Domini — happened that memorable accident and experiment of the reviving Nan Green,

which is to be ascribed and attributed to Dr. Petty, as the first discoverer of life in her and author of saving her.⁹ Here he lived and was beloved by all ingenious scholars, particularly Ralph Bathurst, of Trinity College (then Dr. of Physic); Dr. J. Wilkins, Warden of Wadham College; Seth Ward, Professor of Astronomy; Dr. Wood, Thomas Wallis, M. D., etc.¹⁰ Dr. Petty was resident in Oxford 1648, 1649, and left it, if Anthony A. Wood is not mistaken, in 1652. He was about 1650 elected Professor of Music at Gresham College by the interest of his friend, Captain John Graunt, who wrote the "Observations on the Bill of Mortality," and at that time was worth but forty pounds in all the world.¹¹ Shortly after (A. D. 1652), in August, he had the patent for Ireland; he was recommended to the Parliament to be one of the surveyors of Ireland, to which employment Captain John Graunt's interest did also help to give him a lift; and Edmund Wyld, Esq., also, then a member of Parliament and a great fautor of ingenious and good men for mere merit's sake (not being formally acquainted with him) did him great service, which, perhaps, he knows not of.¹² To be short he is a person of so great worth and learning, and hath such a prodigious working art, that he is both fit for and an honor to the highest preferment. By this surveying employment he got an estate in Ireland (before the restoration of Charles II.) of £18,000 a year. He hath yet there £7,000 or £8,000 a year, and can from Mt. Mangorton, in the county of Kerry, behold 5,000 acres of his own land.

A. D. 1667, on Trinity Sunday, he married the relict of Sir Fenton, of Ireland, Kt., daughter of Sir Hardress Waller, of Ireland, a very beautiful and

ingenious lady, brown, with glorious eyes, by whom he hath sons and daughters, very lovely children, but all like the mother. I remember there was a great difference between him and Sir ———, one of Oliver's Knights, about 1660. They printed one against the other. The knight had been a soldier and challenged Sir William to fight with him. Sir William is extremely short-sighted, and being the challengee, it belonged to him to nominate place and weapon. He nominates for the place a dark cellar and the weapon to be a great carpenter's axe. This turned the knight's challenge into ridicule, and so it came to nought.¹³ He can be an excellent droll (if he has a mind to it), and will preach "ex tempore" incomparably either the Presbyterian way, Independent, Capucian friar, or Jesuit.¹⁴ He had his patent for Earl of Kilmore and Baron of Shelborne, which he stifles during his life to avoid envy, but his son will have the benefit of the precedency.¹⁵ A. D. 1660 he came into England, and was presently received into good grace with His Majesty, who was mightily pleased with his discourse. A. D. 1663 he made his double-bottomed vessel, of which he gave a model to the Royal Society made with his own hands, and it is kept in the repository of Gresham College. It did do a very good service, but happened to be lost in an extraordinary storm in the Irish Sea.¹⁶

He is a person of an admirable inventive head and practical parts. He hath told me that he hath read but little, that is to say, not since twenty-five years, and is of Mr. Hobbes' mind, that had he read much, as some men have, he had not known so much as he does, nor should he have made such discoveries and improvements.¹⁷

He went towards Ireland in order to be a member of that Parliament, March 22, 1679-1680.¹⁸ I remember one St. Andrew's Day (which is the day of the general meeting of the Royal Society). I said methought it was not so well that we should pitch upon the patron of Scotland's day; we should rather have taken St. George or St. Isidore (a philosopher canonized). "No," said Sir William, "I would rather had it been on St. Thomas, for he would not believe till he had seen, and put his fingers into the holes according to the motto, '*nullius in verba.*'"

He hath told me that he never got by legacies in his life but only ten pounds, which was not paid. He hath told me, that whereas some men have accidentally come into the way of preferment by being at an inn, and there contracting an acquaintance on the road, or as some others have done, he never had any such like opportunity, but hewed out his fortune himself.¹⁹

He is a proper handsome man, measured six-foot high, good head of hair moderately turning up: vide his picture as Dr. of Physick. His eyes are a kind of goose-grey, but very short-sighted, and as to aspect beautiful, and promise sweetness of nature, and they do not deceive, for he is a marvelous good-natured person. Eyebrows thick, dark and straight. His head is very large. He was in his youth slender, but since these twenty years and more past he grew very plump, so that he is now *abdomine tardus*. This last March I persuaded him to sit for his picture to Mr. Logan, the graver, whom I forthwith went for myself, and he drew it just before his going into Ireland, and is very like him. But about 1659 he had a picture in miniature drawn by his friend and

mine, Mr. Samuel Cowper (prince of limners of his age), one of the likest that ever he drew.

I have heard Sir William say more than once that he knew not that he was purblind, till his master (a master of a ship) bade him climb up the rope ladder, and give notice, when he espied such a steeple (somewhere upon the coast of England or France, I have forgot where), which was a landmark for the avoiding of a shelf. At last the master saw it on the deck, and they fathomed and found they were but —— foot of water.²⁰ Before he went into Ireland he solicited, and no doubt he was an admirable good solicitor. I have heard him say that in soliciting he could dispatch several businesses, nay, better than one alone, for by conversing with several he should gain the more knowledge and the greater interest.

In the time of the war with the Dutch they concluded at the council board at London, to have so many out of Ireland (I think 1,500). Away to Ireland came one with a commission, and acquaints Sir William with it. Says Sir William: “You will never raise this number here.” “Oh,” said the other, “I warrant you I will not abate you a man.” Now, Sir William knew it was impossible, for he knew how many ton of shipping belonged to Ireland, and the rule is to so many ton of shipping so many men. Of these ships half were abroad, and of those at home so many men imperfect. In fine, the commissioner could not raise above 200 seamen there. So we may see how statesmen may mistake for want of this political arithmetic. Another time the council of Dublin were all in a great racket for the prohibition of coal from England and Wales, considering that all about Dub-

lin is such a vast quantity of turf, so they would improve their rents, set poor men on work and the city should be served with fuel cheaper. Sir William knew *prima facie* this project could not succeed. Said he: "If you will make an order to hinder the bringing in of coals by foreign vessels, and bring it in vessels of your own, I approve of it very well. But for your supposition of the cheapness of the turf, it is true it is cheap on the place, but consider carriage, consider the yards that must contain such a quantity for respective houses; these yards must be rented. What will be the charge?"

Memoranda: About 1665 he presented to the Royal Society a discourse of his in manuscript of building of ships, which the Lord Brounker (then president) took away and still keeps, saying, "It was too great an arcanum of state to be commonly perused;" but Sir William told me that Dr. Robert Wood has a copy of it, which he himself hath not.

Sir William Petty died at his house in Piccadilly (almost opposite to St. James' Church), on Friday, 16th day of December, 1687, of a gangrene in his foot, occasioned by the swelling of the gout, and is buried with his father and mother in the church at Rumsey, in Hampshire. My Lady Petty was declared Baroness of Shelborne and her eldest son Baron of the same, a little before the coming in of the Prince of Orange.

CHAPTER II.

ILLUSTRATIONS AND NOTES ON PETTY'S
LIFE FROM CONTEMPORARY SOURCES.

¹In 1769 edition, "University of Oxon." All the manuscript copies of the "Will" that I have seen, read "Caen."

²According to Burrows' "Register," p. 483, he took the M. D. degree in 1650.

³Petty here refers to the "Invisible College" or "Philosophical Club," out of which grew later on the Royal Society. Cf. Masson's "Life of Milton," iii, 662, and note.

⁴Petty was Fellow and Vice-Principal of Brasenose College in 1651 and 1659. Burrows' "Register," p. 483.

⁵Ä. Wood gives his father's name as Anthony. "Athenae oxonienses," iv, p. 215.

⁶The compiler of the catalogue of the Lansdowne manuscripts in the British Museum asserts that a Hampshire clergyman, William Petty, whose manuscript letters are indexed in the collection, was a brother of Anthony Petty, and conjectures that from this relative Sir William received his Christian name.

⁷On Petty's return to England, probably through the influence of Hobbes, he was introduced to Hartlib. This remarkable man, whose name is familiar in the literary history of the time (cf. Masson's "Life of Milton"), became Petty's patron. In a letter to Boyle of 1647 (Boyle's Works, vi, 77) he expresses great admiration for the talents of his young acquaintance.

I put into your hands the design of the history of trade. The author is one Petty, twenty-four years of age, a perfect Frenchman, and a good linguist in other vulgar languages, a most exact anatomist, and excellent in all mathematical and mechanical learning. As for solid judgment and industry altogether masculine.

Petty soon became interested in Hartlib's scheme for the reform of education, and showed his desire to co-operate in the movement by writing a "Tractate on Education," dedicated to Hartlib. At the same time he invented a copying machine. Reference is made to this invention in the "Tractate." A parliamentary patent¹ was secured for it, and a description of it, dedicated to Robert Boyle, was printed in 1648.² This invention, like a good many of Petty's later mechanical devices, proved a failure. Curiously we find in a letter, written by Sir Christopher Wren some years after, a reference to a similar machine.³ Wren, without mentioning any name, complained that a model of his invention, in a still imperfect condition, had been seen by chance by a visitor, and reproduced. The failure of the reproduction of his unfinished invention had made it impossible for him to give to the world his own perfected instrument for multiplying copies of writing. The history of Petty's

¹Boyle's Works (second edition), vi, 137.

²Rushworth, "Historical Collection," part iv.

³Wren's "Parentalia", p. 215.

own invention leads us to suspect that he may have been the person whom Wren accuses of this dishonorable act. From what we know of Petty's insensibility to strict honesty, where he saw any chance of furthering his own interests, we cannot say that he was incapable of such an action.

In 1646, along with Hartlib and Boyle, Petty joined the "London Philosophical Society." This unpretentious club, inaugurated in 1645 by Theodore Haak, was the parent of the Royal Society. The object of the society, which included, besides these already mentioned, the well known names of Drs. Wilkins and Wallis, was the promotion of the study of natural science.¹

⁸Being a man of fortune, he sided with the people then in authority. He went to Oxon when the great rout of loyal scholars was made by the parliamentary visitors, settled there for some time, followed the faculty of physic, exercised anatomy, and became professor of anatomy. A. Wood, "Athenae Oxonienses", iv, p. 215.

⁹An account of this incident is given in a pamphlet entitled "News from the Dead," reprinted by Morgan in the "Phoenix Britannicus," p. 232, ff.

¹⁰Petty had not allowed his interest in the "Philosophical Society" to drop. Some of the original members of the London club, now resident at Oxford,

¹Cf. Wallis's account of the Society in the Introduction of Peter of Langtoft's Chronicle.

along with several new adherents, held meetings at his lodgings. Cf. Introduction to Peter of Langtoft's Chronicle.

¹¹Burrows' "Register", p. 335, April 18, 1651. Principal and fellows of Brasenose gave Petty leave of absence for two years with continuance of his stipend of thirty pounds a year.

Evelyn, ii, p. 95. "Sir William came from Oxford to be tutor to a neighbour of mine."

¹²Petty's career in Ireland is hardly touched upon by Aubrey. The following account is derived from his own works, chiefly the "Down Survey." This book, unlike Petty's other works, is extremely dull, and difficult reading. Pendergast, in "The Cromwellian Settlement," has made constant use of it, and with the help of his book, I have been able to throw some light on the next few years of Petty's life.

Strafford, in following out the familiar policy of transplanting English settlers into Ireland, had brought about a rebellion among the natives. To suppress this outbreak, an army had to be sent from England. This army was raised and supported by money advanced by private individuals, subscribed on the security of 2,500,000 acres of Irish land to be confiscated at the close of the rebellion. The debt was still unsettled at the end of Cromwell's Irish campaign in 1652. As the army had not yet received its pay, the government proposed to settle both of these claims, by granting to each party confiscated

land sufficient to meet their demands. The army was induced to accept the same rates as had already been agreed upon by the subscribers, who are called for brevity the "Irish Adventurers." According to this agreement, the money value of a thousand acres of land varied from £200 to £600, according to quality and location. The original Irish landowners, and even the older English proprietors who had lived in the district of rebellion, were to be transported to Connaught. It was proposed to send the poorer native inhabitants to foreign countries, the men to Spain, the women and children to the West Indies.

The first step in carrying out this scheme was a survey of the land, which was to be set off for the various claimants. Worsely, the surveyor-general, had made a survey in 1653, which was notoriously erroneous. Petty immediately pointed out the defects and the way to remedy them, offered to undertake a new survey, to be concluded within thirteen months, and to prepare a general map of the whole country. The surveyor-general, anxious to retain this work in his own hands, subjected every part of Petty's offer to minute criticism. His objections were answered, and Petty, supported by influential friends, secured the contract, which was signed on December 24, 1654. The survey was performed with the promised rapidity, not by introducing new scientific methods, but by careful direction of the numerous subordinates among whom the labor was apportioned. The opposition which had met Petty at every step had a deeper ground than the personal enmity of Worsely. Cromwell was carrying out in Ireland the policy that he had already adopted in England, of trying to draw to the support of the government

the conservative element of the country. He attempted to attract the Presbyterians in Ireland, who had large vested interests there, and used them to break down the power of the clique of army officers, who were Anabaptists, and notoriously republican in politics. Henry Cromwell, who supplanted Fleetwood as commander of the forces in Ireland in 1655, had directions from his father to give the country a settled government in place of the anarchy which the selfish interests of the army had encouraged. Petty allied himself with the Protector's party, and was soon promoted to be Henry Cromwell's secretary, and finally Clerk of the Council.

We have already seen what were the initial difficulties of the "Down Survey" (Petty's undertaking was so-called because in it the natural divisions of the country were marked down). The end of his task brought fresh obstacles. On the completion of the work Petty requested that the sureties should be discharged, the survey accepted, and payment made for his services. A committee of officers directed the surveyor-general to examine the survey. At the expiration of three months, he made a report advising its rejection on the ground of non-fulfilment of the terms of the contract. A fresh committee was then appointed, not so inimical to Petty, to review the entire matter. This body finally accepted the "survey" on the 17th of May, 1656. Petty's other requests were reserved for consideration, and only after a delay of more than six months were his sureties released, and his claim for pay acknowledged. The amount received by him for conducting the survey was £18,532, out of which sum the pay of

his assistants and general expenses were to be defrayed. He had some difficulty in collecting from the army the amount which they had agreed to pay at the rate of a penny for each acre. In February, 1657, there still remained due to him from this quarter £614. This he was allowed to collect personally, and it was raised to £3,181 to cover the costs of collection, and to remunerate his other services to the state. In payment of this debt, 9,665 acres of land were allotted to him. This transaction brought upon him many charges of fraud. On the public records this large allotment was made over to him for £1,000. His own explanation is that this money belonged to him personally, and that no mention is made of his previous claim of £3,181.

In the work of allotting the lands among the claimants, Petty took a prominent share. He was one of four commissioners, to whom the duty was assigned, and had really the responsibility of the whole matter. This new position made him a more conspicuous object of attack, by placing in his hands many opportunities for taking advantage of this authority. In this division, as the individual share was decided by lot, much discontent was caused by differences in the quality of the land, and bribery was readily employed to remedy adverse fortune. In the meantime the "Irish Adventurers" were impatiently waiting for satisfaction. They had already refused to be assigned tracts of lands apart from the army, fearing that peaceful possession would be impossible without military protection. Now they were alarmed at the prospect of the number of claimants exceeding the supply of land. Henry Cromwell, lately become Lord Deputy of Ireland, ad-

vised the "Adventurers" to entrust their interests to Petty. In the summer of 1658 he visited London and arranged with them a satisfactory agreement, in which they consented to accept his survey as the basis for their own allotments. The number of those waiting to be satisfied was very great, and the conflicting interests caused considerable delay. There were held as many as 33,400 debentures on Irish lands. Of these were returned only 11,804, the rest being held back in the hope of obtaining better terms. The delay caused a vast amount of speculation, for the poorer soldiers were obliged to sell their debentures for ready money to their superior officers, who desired to get an estate in Ireland. As a government official Petty could not legally take a share in this land jobbery, but he soon managed to overcome this difficulty. His salary as land commissioner was in arrears. The government compensated him by assigning him 6,000 acres of land, and gave him permission to buy £2,000 worth of debentures. Such notorious advantages could hardly pass unmarked, especially as Petty's official pluralism and his influence with Henry Cromwell made him all the more open to attack.

One must give him the credit of possessing conspicuous energy. His various duties he performed assiduously. He lived abstemiously. He spent a large part of the night dictating to his secretaries. He mastered the details of his varied official work by systematic labor. While he tells us that he disregarded the unpopularity which he brought upon himself, it is evident that he was somewhat sensitive to its violence. In a letter to Boyle written in February, 1657, he expresses himself in the following

words: "I never lived a more miserable life than now. I wish I had the opportunity to make you understand the state of some things; till when suspend your judgment of me. I think I can demonstrate the necessity of the most malign action I am taxed with."¹ In August, 1658, we catch a glimpse of Petty during his visit to London on the business of the "Adventurers'" claims. Hartlib, in a letter to Boyle, writes: "Dr. Petty spent two hours with me; he talked of an educational plan on which he proposed to spend £2,000. The history of trade he looks upon as the great pillar for the reformation of the world."²

Upon the death of Oliver Cromwell the attacks against Petty became more violent. In the person of Sir Jerome Sankey he found a most active and determined enemy. During Petty's residence at Oxford, Sankey had been a fellow of All Souls and Proctor of the University.³ He gave up his academic career to try his fortune in a more active field. He had served with distinction in Ireland under Cromwell. In religion he was a fanatical Anabaptist, and in politics a prominent member of the army faction. According to Petty's statement, Sankey's enmity was due to his watchfulness in preventing Sankey from illegally changing his allotment of land.

In November, 1658, an anonymous libel against Petty was brought to the notice of the Lord Deputy. In this he was accused of general official misconduct. So high he stood in Cromwell's favor, so great was his influence, that his enemy compared him to Car-

¹ Boyle's Works, vi, 136.

² Boyle's Works, vi, 113.

³ Cf. Burrows' "Register," p. 227.

dinal Wolsey. A committee of seven officers were charged to investigate the truth of the charges contained in the libel. He was acquitted, but a dissenting report was presented by the minority in which he was accused of magnifying the debt due to him by the army, of charging the army with debts not really due by them, of reserving for himself portions of choice lands. Petty replied to this in general terms, claiming that all his actions were done with full Government sanction. He ended by asking for a speedy trial.

In the meantime Petty had been elected a member in the Parliament summoned by Richard Cromwell. In this body he represented the town of West Low, in the county of Cornwall. When Parliament met in March, Sankey, also a member, took an early occasion of bringing up his charges against Petty. In Burton's "*Diary*"¹ we find a report of Sankey's speech. The following are the opening words: "I open the highest charge against a member of this house that ever was; such news has not been of a long time; a high breach of trust. It is against a great person. . . . He is both cook, caterer and hunt; is commissioner and surveyor; has had the disposing of two million acres of land. He is a man of great parts, but has highly wronged them. His name is Dr. Petty." Sankey went on to accuse him of bribery and fraud. Several members spoke in Petty's favor and recognized his services to the State. Sankey was directed to put his charges in a more specific form, and the Speaker on March 26, 1659, commanded Petty to attend and answer the following charges: 1. Dealing in Debentures. 2.

¹ Cf. *vol. iv*, pp. 244-49.

Taking bribes. 3. Appropriating money belonging to the state. Petty arrived in London on the 17th of April. On the 19th he took his seat. On the 21st he made his defense. He complained that his services had never been paid. In the conduct of the survey he had kept strictly within the conditions of his contract, and claimed government permission for dealing in debentures. The attacks against him he ascribed to personal jealousy. His responsibility as land commissioner was shared by three others. As Clerk of the Council his conduct had met with the approval of his superiors. He now wished a speedy trial. Sankey made a rather rambling reply, in which he mentioned by name several persons from whom Petty had received bribes, and concluded by charging him with retaining in his possession all the original records of the survey.

A stop was put to further proceedings by the dissolution of Parliament on the following day. Petty was disappointed by seeing the prospect of a trial more remote than ever. Sankey continued to threaten him with bringing the case before the Protector and the Council of State. When nothing was done in the matter, Petty requested Sankey to submit the charges to Fleetwood for arbitration.

Fleetwood excused himself from acting on the plea of the unsettled state of public affairs. Henry Cromwell, who had hitherto exerted himself in Petty's favor, wrote as follows in a letter of April 11, 1659, to Thurloe:¹ "If Sir Hierom Sankey doe not run him (Petty) down with numbers and noise of adventurers and such other like concerned persons, I believe the Parliament will finde him as I have represented him. He has curiously deluded

¹Cf. Thurloe, vii, 651, also 684.

mee these four years if he be a knave. . . . Petty is not the only marke aimed at." Despairing of a trial, Petty returned to Ireland on the 12th of May. The fall of the Protector, Richard, at the end of the month, placed his brother's power in Ireland in a precarious position. It was impossible to retain Petty in official relations with him any longer. Deprived of all his offices, Petty returned to England in June, bringing the following letter of recommendation: "The bearer, Dr. Petty, has been my Secretary and Clerk of the Council, and is one whom I have known to be an honest and ingenious man. Great endeavours have been made to beget prejudice against him."¹ Sankey had now risen into a position of much importance as a member of the army faction who were now governing the country. In July the subject was revived in the Rump Parliament, and Petty was kept under surveillance to await his trial. The case was suddenly referred to the Commissioners for Ireland, and nothing more was heard of it.

In the autumn of this year Petty joined the political club known as the "Rota," an organization formed by Harrington to discuss and advocate the well-known political theories of that philosopher. No practical result attended its deliberations, but as it became the rendezvous of many clever people, its discussions were the talk of the town.²

¹Mss. Letter indexed in Catalogue of Collection of English Letters, Brit. Mus.

²Pepys' Diary (vol. i, p. 7), 10 January, 1659. "To the coffee house [Miles's] where were a great confluence of gentlemen, viz.: Mr. Harrington, Poultney, chairman, Gold, Dr. Petty, etc., where admirable discourse till nine at night."

A. Wood, "Athenae Oxonienses", iii, p. 11. "In 1659, in the beginning of Michaelmas term, they (Harrington and his disciples)

The odium attached to Petty's Irish career still pursued him, for we find him now appealing to the public for the first time in a defence, contained in a broadside of four pages, entitled a "Brief of Proceedings between Sir H. Sankey and Dr. Petty." This pamphlet contains a review of the charges brought already to the notice of Parliament with Petty's replies. Then comes a list of the charges which had been brought before the Irish Commissioners. Petty points out with great satisfaction the discrepancies in the two lists. Many of the earlier charges of fraud and bribery had been dropped, and in their place less serious accusations substituted. In the following year he published a more complete vindication under the title "Reflections upon some persons and things in Ireland." An interesting feature of this work is a prefatory letter signed J. H. I have not been able from these initials to identify the writer. He was an old friend of Petty. Their acquaintance had begun during Petty's stay in Paris. Like other friends of his youth he had seen, he tells us, with surprise and regret, the course of Petty's career in Ireland. Those who had formerly looked upon him as an ardent devotee of science had lamented his defection from their ranks, and begged for an explanation. Petty in his reply refutes the charge of neglecting his earlier and more honorable pursuits, by the rather ingenuous assertion that he had undertaken the "Survey" in order to demonstrate to the public the utility of a scientific training. The most interesting part of the work is the conclusion, which throws much light on the whole transaction. had every night a meeting at the then Turk's Head, called Miles' Coffee House.

"Dr. William Petty was a rotaman, and would sometimes trouble Harrington in his club." *Ibid.* p. 19.

In 1659 he had not dared to say the whole truth for fear of offending those in power. Now he is not afraid of the consequence of free speech. He explains his unpopularity by the conspicuous position he had held under Henry Cromwell's Government. The fanatical Anabaptists, Petty declares, hated Cromwell's policy, but hesitated to openly oppose a son of the Lord Protector. They then determined to ruin Petty's reputation in order to discredit the Government under which he served, singling him out for attack, because he had made himself obnoxious by his watchfulness in circumventing their intrigues. "Sectaries," he says, "are always of perverse mind and jealous." Besides, there were especial reasons for the extreme bitterness against him. Sankey, his opponent, had the ambition to cut a great figure. The under-surveyors were discontented. The personal collection of the debt owed to him by the army had contributed to his unpopularity. In the work of allotting the confiscated land his fellow commissioners were inactive and desired to shift to his shoulders the responsibility for any mistakes. By refusing to associate himself with any faction, or to take any part in religious controversies, he had had no chance to secure personal supporters. He had a ready tongue, he confessed, and was fond of a jest. The exercise of these dangerous gifts had cost him dear. His indifference in Church matters had made him obnoxious to all parties. By some he was called a Papist, by others an Atheist.

¹³Story of this duel is repeated by Evelyn, vol. ii, p. 96, who by mistake names Sir Aleyn Brodrick as Petty's antagonist.

¹⁴This faculty of imitation also noticed by Evelyn, vol. ii, p. 96.

¹⁵Evelyn, ii, p. 97. "He could never get favour at Court, because he outwitted all the projectors that came near him."

¹⁶This double-keeled boat is referred to several times in Pepys' "Diary," pp. 31, 87, 89, 193, 210; also in Evelyn's "Diary," i, 358, 378-387; ii, 95.

¹⁷Pepys' "Diary," vol. ii, 89. Petty had a small opinion of the "Religio Medici" and the "Hudibras." He could hardly be expected to sympathize with either work. In his manuscript directions to his sons he advises them to read Aristotle's "Rhetoric," Hobbes's "De Cive," Justinian, and the Common Law. In a letter to Boyle¹ he discourages reading.

¹⁸The following account of the latter part of Petty's life may supplement the scanty information given by Aubrey. Petty's interests in his earlier pursuits revived with his retirement from public life. Hartlib hoped that he would make some practical use of his "Tractate on Education." He had talked of spending a part of his fortune in carrying out his educational schemes.² At least there was now an opportunity for again taking up the neglected "History of Trade." The meetings of the Philosophical Club,

¹ Works, vi, 138.

² Cf. Evelyn's "Correspondence," iii, 131.

interrupted for some time during the unsettled state of public affairs, were resumed. It was resolved to give the organization a more permanent and a more serious character. Petty was one of the promoters of the change which transformed the "Philosophical Club" into the Royal Society. He was one of the original Fellows, and was placed on the Council.¹ In 1661, April 11, he was knighted and was sent by Charles II to Ireland as Surveyor-General.² In the Irish Parliament, which met early in the summer, he sat as member for Enniscorthy. In August he was sent to England as one of the commissioners from that Parliament to watch over the interests of the English landowners. The Act of Settlement of September, 1662, with the Explanatory Act of the following year, were favorable to Petty and the interests that he represented.

To keep possession of his property he was obliged to engage in continual lawsuits, and his name appears frequently in petitions to the King to recognize his claims.³ He did not scruple to use questionable means to defend the integrity of his estate. After winning a suit against the Duke of Ormond he boasted that he had employed witnesses, who, to use his characteristic expression, would swear through a six-inch board.⁴

Knowing the policy of the English Government towards Ireland, we are hardly surprised at find-

¹ His return to a scientific life—to the unprofitable pursuit of a Virtuoso—was of short duration. As Hartlib pointedly expresses it, "He had other fish to fry."

² Cf. A. Wood, *op. cit.*, and Worthington's "Diary," anno 1661.

³ Carte papers in Bodleian Library.

⁴ Carte's "Ormond," cited by Lecky, "History of England," ii, p. 194.

ing Petty appointed one of the commissioners, who sat as a Court of Claims to settle the Irish land question. In 1666 he appeared personally with other prominent Irishmen before the English Parliament to protest against the Bill which prohibited the export of Irish cattle into England.¹ In 1679 he was again a member of the Irish Parliament, and took an active part in opposing the contract which the Government had made with the revenue farmers. In the later years of his life he became a member of the Irish Council of Trade. As an Irish landlord he devoted himself to the industrial development of the country. An account of his Colony of Kenmare is given by Lord Macaulay.² Much of the later portion of his life he passed in England. The intervals of his absence from London are indicated in the "Transactions of the Royal Society." From 1661-1671 his name does not appear. A shorter period of absence is marked from 1675-1678, and again during the years 1680 and 1681. For several years he remained on the Council of the Society. In 1674 he became its vice-president. In Dublin he founded the Irish Royal Society, and became its first president in 1684. In the year 1677 he began to complain of ill health. This and the worries of constant litigation weighed heavily upon him. In a manuscript letter to Aubrey he uses the following language: "I begin to be afraid of living in a place where we have ten exasperated enemies for one friend, and where I am obliged to spend my whole time upon what I hate." The failure of his naval experiments he took greatly to heart, and he complained bitterly of the ridicule their want

¹ Carte's "Ormond," iv, 243.

² Cf. "History of England," ch. 12.

of success had brought upon him. In another letter he says: "My anxieties are heartbreaking. My services in Ireland have never been recognized or rewarded. Some accuse me of madness; others call me fanciful." Invited by a friend to embark in a commercial enterprise for colonizing Tobago, he refused, because he feared that those in power might accuse him of being a malcontent. He strongly resented the criticism excited by his works. It was a matter of much annoyance to him that some of his writings were printed against his wish, and others he was not allowed to publish by those in authority.

¹⁹ Petty is characterized by Pepys and Evelyn in the following way :

Pepys' "Diary," vol. ii, 88. "William Petty, who in discourse is, methinks, one of the most rational men that ever I heard speak with a tongue."

Evelyn, ii, p. 96. "There is not a better Latin poet living when he gives himself that diversion; nor is his excellence less in council and prudent matters of state; but he is so exceeding nice in sifting and examining all possible contingencies, that he adventures at nothing which is not demonstration. There was not in the whole world his equal for a superintendent of manufacture, and improvement of trade, or to govern a plantation. If I were a Prince, I should make him my second Counsellor at least. There is nothing difficult to him."

²⁰A story current in Petty's family and communicated to Ward, the author of the "Lives of the Gresham Professors," is preserved in some manu-

script notes made by Ward now in the British Museum. Petty, according to this tradition, was serving on a small merchant vessel, plying between ports on the Channel. The master of the vessel broke the lad's arm, while administering a flogging. He was put ashore on the coast of Normandy, was kindly given shelter in a monastery, and was there educated by the monks. Aubrey's story is partly corroborative of the family tradition.

CHAPTER III.

THE TRACTATE ON EDUCATION AND THE BILLS OF MORTALITY.

In the "Tractate on Education" it is interesting to trace the main lines of thought which are found more clearly defined in all of Petty's subsequent contributions to literature. It is a youthful performance, and a good deal of space is devoted to details of a model institution of learning, which was never to see the light. The cast of mind which prompted the plan was permanent, and in it are to be found both the strength and the weakness of Petty's character.

The tract opens with a complaint of the anarchy prevalent in the world of learning. Each one is laboring for himself. No one knows either what others are doing, or what is in itself worth being done. How are we to find out such arts as are yet undiscovered? How are we to learn what is already

known by more compendious ways? He answers these questions by recommending that all works describing mechanical inventions should be collected. Of these an abstract should be made. This abstract would give a picture of the present state of science.

In order to make more rapid advance in the future there must be a general training for children, in what he calls "*Ergastula Litteraria*." In these literary work-houses a child would not only learn reading and writing. He should be taught to do something towards supporting himself. Education should begin by training the powers of observation and strengthening the memory, by directing both to the objects of sense. Drawing and design are indispensable. Of studies, arithmetic and geometry alone are absolutely necessary. Foreign languages can be readily dispensed with. If they are to be learned, they might be taught by methods more satisfactory and less wasteful of time. The invention of a system of real characters would do away with the necessity of linguistic study. Even reading and writing could be taught by improved methods. In this way more time might be spared for mechanical training. So much for elementary instruction. In the place of a university he recommends a college of tradesmen. Here able mechanics were to reside, rent free. Their labors and experiments would be of inestimable value. They would furnish the material for a real interpretation of nature. As subordinate parts of this college, he proposes a *Noscomium Academicum*, a *Theatrum Botanicum*, a Menagerie, an Observatory. All of these were to keep a practical end in view. The advancement of the arts was to be the sole object. To make this point clear, considerable space

is occupied with a list naming the officers in these institutions, with a minute account of their duties. As the chief text-book he recommends a work to be entitled "Velleus Aureum." This is a compilation giving a succinct account of the different ways of making a living, with especial stress on approved methods of becoming rich. An essential part of this work must be a carefully prepared history of trade. The great advantage of this educational scheme will be to instil in every one an "auri sacra fames," to the great advantage of the State, for all countries where trade and commerce flourish are rich. If such a reform could be carried out, "there would not be then so many fustian and unworthy preachers in divinity, so many pettifoggers in the law, so many quacksalvers in physick, so many grammaticasters in country schools, and so many lazy serving men in gentlemen's houses."

The authorship of the "Bills of Mortality" is discussed by McCulloch in his "Literature of Political Economy," p. 271. There did not seem to him to be any good reason for assigning the authorship of the book to Petty. With this conclusion others, such as Roscher in his well-known essay, John in his "History of Statistics," and Dr. Cunningham, have coincided. Professor De Morgan in the "Budget of Paradoxes," pp. 68-69, adopts the same attitude, and in a controversy carried on with Mr. Hodge in the pages of the *Assurance Magazine* he virtually follows the lead of McCulloch.

Briefly stated, the arguments against assigning the book to Petty are as follows: In his acknow-

ledged works he refers to Graunt's book as Graunt's and not as his own. Petty in 1660 was too much occupied to write a book demanding such an amount of original investigation. There is no reason given for an unwillingness to acknowledge the authorship on Petty's part. The "Bills of Mortality" contained nothing offensive. On the other hand, the popularity and novelty of the book would certainly have induced Petty to claim it as his own, if he had really been the author. Moreover, between Petty's works and the "Bills of Mortality" there is considerable difference of style, language, opinion, and knowledge. The witness of contemporary testimony is not decisive. The fifth edition of the work, published in 1676, was edited by Petty. His contemporaries might accordingly ascribe the book to him.

This view, however plausibly stated, hardly seems to give adequate weight to contemporary testimony. How are we to reject the following statement of Evelyn:¹ "He (Petty) is author of the ingenious deductions from the bills of mortality, which go under the name of Mr. Graunt."

John Aubrey, whose friendship with Petty was closer than Evelyn's, and who had even a better opportunity than Evelyn for discovering the real author, tells us that the "Bills" was due to him.² We are not able to assign a reason for Petty's wish to conceal his authorship under the name of a friend, but we do know that several of his works were published anonymously during his lifetime. The following letter to Aubrey of the 29th of May, 1678, may throw some light on this matter. "As for the reprinting the book of taxes, I will not

¹ Evelyn's "Diary," ii, 97.

² Aubrey, "Letters and Lives of Eminent Persons," p. 488.

meddle with it; I never had thanks for any public good I ever did. I am not forward to printing the Political Arithmetic, but do wish that what goeth abroad were compared with the copy in Sir R. Southwell's hands, which I corrected in 1679."¹ The treatise on taxes to which he here refers was printed in 1662 anonymously. Petty's name does not appear on the title page until 1690. It is difficult to discover any great diversity in style, language, or in any other point between the "Bills" and Petty's authentic writings. Fortunately there is an effective way of testing this question. The first edition of the "Bills of Mortality" bears the date 1661. It was, however, probably published in $\frac{1661}{1662}$. The following passage from Pepys' "Diary," 24th March, 1662, throws some light on the date of its publication: "To Westminster Hall, and there bought Mr. Grant's book of observations upon the weekly bills of mortality." The "Treatise on Taxes" appeared in 1662. The two works were nearly coincident. The following parallel passages show a conspicuous similarity. The pages are quoted from the first editions of each book:

"BILLS," page 57.

"We incline, therefore, to think the parishes should be equal or near, because in the reformed religion the principal use of a church is to preach in."

Page 19.

"I make this question, whether, since they do all live by begging . . . it were not better for the state to keep them."

"TAXES," page 6.

"One cause of publick charge in matters of religion is the not having changed the limits of parishes and cures. . . . For now when the ministers of the gospel preach unto multitudes assembled in one place, may not parishes be bigger?"

Page 12.

"In the next place, it will be asked, who shall pay these men? I answer, everybody."

¹ Egerton manuscript, 2231.

Page 55.

"The general observation is that the city of London moves westward. Where the consumption of commodity is, viz.: among the gentry, the vendors of the same must seat themselves."

Page 72.

"It were good to know the geometrical content, figure and situation of all the lands of a kingdom, especially according to its most natural bounds. It were good to know how much hay an acre of every sort will bear; how many cattle the same weight of each sort of hay will feed and fatten; what quantity of grain and other commodities the same acre will bear in one, three or seven years; unto what use each soil is proper; all which particulars I call *intrinsic value*, for there is also another value merely *accidental or extrinsic*."

Page 51.

"Now, forasmuch as princes are not only powerful but rich, according to a number of people (hands being the Father as lands are the Mother or Womb of Wealth), it is no wonder why states by encouraging marriage, advance their own interests."

Passages equally striking might be added to these. Apart from such a minute examination of the "Bills," there are the following additional points which would lead us to the same conclusion. The

Page 23.

"If great cities are naturally apt to remove their seats, I ask, which way? I say, in the case of London it must be westward. . . . If it follow from hence that the palaces of the greatest men will remove westward, it will also naturally follow that the dwellings of others who depend upon them will creep after them."

Page 31.

"I propound a survey of the figures, quantities and situation of all lands, both according to the civil bounds . . . and natural distinctions. . . . If there be ten acres of land I would have it judged whether they be better for hay or corn. . . . This former I call an *inquisition into the intrinsic values of land*, this latter of *extrinsic or accidental follows*."

Page 49.

"Here we are to remember that in consequence of our opinion that labor is the Father and active principle of wealth, as lands are the Mother, that the state by killing, mutilating, or imprisoning their members do withal punish themselves."

most noticeable thing in the first few pages of the "Bills," is the amount of space devoted to a description of different diseases. They are described with a familiarity and precision which only a physician could be expected to have. There are references to Ireland derived apparently from personal observation. Hampshire, Petty's native county, is the only English county mentioned. There are proposals for poor-law reform identical with those found in Petty's works. The remark that gold would take the place of silver, if the art of making it were known, accords with Petty's view. There is the same suspicion of the benefits of charity, the same contempt expressed for theological speculation, that we find elsewhere.

It might be necessary to apologize for devoting so much space to the question of the authorship of a small book of about one hundred pages, published over two centuries ago, if its unique character had not met with uniform recognition by all who have interested themselves in the history of the science of statistics. It is agreed on all sides that this small book was the first step made in marking out the province of a new science, and the first attempt to collect the preliminary data for its construction. The prefaces to the book contain a characteristic defense of his undertaking. It had occurred to him, he says, that some good use might be made of the weekly "Bills of Mortality." Ordinarily they furnished a topic for idle conversation. Now that he has reduced the information scattered in them to a tabulated form, he believes they will be found to contain valuable information. Such speculations as they give rise to should be a concern to all who are interested in giving

a more intelligent direction to the policy of the state. Deductions such as he offers, have, besides, a further advantage, in the fact that the errors of which he may be guilty can be corrected by the material presented. The book opens with an account of the history of the Bills of Mortality from 1592 to his own day with the successive changes in their form. The information they contained in 1661 was as follows: Number of deaths by parishes, the sex, cause of death, and a list of christenings. The form in which this information is presented is subjected to an acute examination. The accuracy of the Bills is accepted on the ground that their contents are mere "matter of sense," not demanding any cultivated powers of observation, except in the list of diseases and casualties. Here it is enough if we know predominant symptoms. Scientific accuracy cannot be looked for. The list of diseases has sixty-four different items. On looking over these some are notably diseases of children. Apparently, then, one-third of all the deaths are due to such diseases. Thirty-six per cent. of those born die before the sixth year. From the number who die by epidemics we get a measure of the climate and air from year to year. In the same way the number of chronic diseases gives us an indication of general healthiness. Longevity is shown by the number of deaths ascribed to old age. The second chapter ends with the statement that some diseases and some casualties bear a constant ratio to the whole number of deaths. Observing that few deaths are due to starvation, it seems a proof of the plentifulness of food. Beggars generally look healthy and strong. It would be best that they should be maintained at the expense of the

state by taxation, as is done in Holland. They should be taught some trade. Their value, from this point of view, without such training is small, for unskilled labor is in reality dearer than skilled labor. The small number of murders occurring in London compared with Paris, he accounts for by the free character of the English constitution, London being guarded by free citizens. About twenty-six pages are given up to an investigation of the plague, and the history and characteristics of other maladies. In chapter vii, after making due allowance for the inaccuracy of the lists of christenings, he reaches the conclusion that in London the death rate is higher than the birth rate. On the other hand, it is certain that the number of buildings in London has increased, and many houses have been changed into tenements. The deficiency must have been made up by immigration from the country. Many provincial towns have notably decreased in population. But the country bills always show an excess of christenings over burials. What is the proportion between London and the rest of the country in population? By a very rough computation based on the number of people to a square mile in a typical market town, multiplied by the whole number of square miles, he finds the population to be 6,400,000 for England and Wales. London is about one-fourteenth of this, because it bears about that proportion of the whole taxation. Then follows an attempt to account for the excessive mortality in London. In chapter viii he notices that there are more males born than females. He remarks that this fact is borne out by all the lists that he has seen, and wonders if it holds good for other countries. The next chapter discusses

the growth of London. This is substantiated by the increase in deaths in healthful years, or in years in which there was no plague. The town is gradually moving westward. The King's Court is at Westminster. The narrow streets of the city are not adapted to increased traffic. The crowding of buildings within the walls has caused people to build new ones outside. Chapter ix contains his favorite argument for the equalization of parishes. It would be more economical and would offer a better division for poor relief. In the next chapter he notices the exaggerated notions of the size of London. It was believed that six or seven million souls might be the true number. Only one in four hundred would die yearly if this were so. How can we estimate the population exactly? To get the result 384,000, which he offers as the true number, he uses three different methods; all are conjectural. In the first method, from the christening list is deduced the number of mothers, and from these the number of families; finally, by allowing eight persons in each family, the total population. A table of mortality by decades, constructed by guess-work, is fitly followed by the astounding statement that London doubles its population in eight years. In chapter xii, with information supplied by lists from a country parish, he reaffirms what he has already said in regard to the population of the two sexes, giving the ratio as fifteen females to sixteen males. Whatever else he finds in them only confirms what the study of the London Bills has lead him to adopt. He brings the work to a close by again insisting on the usefulness of such inquiries. Many spend their time uselessly in trying to make gold. The result of such efforts,

if they succeeded, would be to set silver in the place gold now occupies. Every one should try to do something new. The world is already filled with transcriptions of work already done. An ordinary trade education only teaches men how to supplant one another. The true politics is how to preserve the subject in peace and plenty. The foundation of this science is to understand each country according to its natural divisions. Both trade and government might be made certain if such statistical information as the "Bills" contain could be made use of and its application extended. If such facts were known it would appear how few are engaged on necessary labors, how many do nothing, and are "mere gamesters by trade," how many live by puzzling others with "unintelligible notions in divinity and philosophy," how many by fighting, how many by trades of pleasure or ornament, how few "in raising and working necessary food," how few study nature and things. A clear knowledge of all these matters is, above all things, "necessary to a good, certain and easy government."

The work was enlarged in 1665 by the insertion of two new country bills; by some remarks on the Dublin bills; by actual enumeration of certain districts in London; by observations on foreign cities. After Graunt's death in 1673, the fifth edition was published by Petty in 1676, with two or three pages on the bills of foreign cities added.

Petty continued these investigations by publishing in 1682 his essay on the growth of London. Here he limits himself to ascertaining solely the population of London. He uses the mortality tables—adopting the old ratio of one death in thirty—

and corrects the result by comparing it with the number obtained by multiplying the total number of houses in London by 8. From these figures he can compute the population of England, for London bears the eleventh part of the assessment of taxation. The data furnished by the poll money, by hearth money, and by the lists communicants, give an approximately like result.

In the third essay on political arithmetic, published in 1686, we have Petty's final statement on this question. He says there are three methods of reaching the number of people in London. (1) By houses and families. (2) By the number of burials. (3) By the number of those who die of the plague. In the first case he finds by observation that in every family there are on the average $6\frac{1}{3}$ persons. In the second he uses his ratio of 1:30, which he has since confirmed by further observation. In the third he proves by the decrease in the christening list that the plague carried off one-fifth of the population, allowance being made for those who left the city.

Petty was entirely conscious of the great weakness in all these computations. They were conjectural, and he recognized it. He disclaims mathematical accuracy. "I hope no man takes what I said about the living and dieing of men for mathematical demonstration," are the words used in a manuscript letter to Aubrey.

At the conclusion of his "Observations upon the Dublin Bills" he makes the following confession of the purely tentative character of his deductions: "Without the knowledge of the true number of the people, as a principle, the whole scope and use of keeping bills of births and burials is impaired ; wherefore

by laborious conjectures and calculations to deduce the number of people from the births and burials, may be ingenious, but very preposterous." The way to remedy these defects in statistical material he himself pointed out by offering specimen bills which should contain the information he lacked, and he proposed plans for securing more exact information.

It is not necessary to submit Petty's other applications of mathematics to close examination. Among them may be mentioned his estimates of the total wealth in England, of the amount of money necessary to drive the trade of England, of the loss sustained by the Irish rebellion. These and others of like character are of no great scientific value.

A much more interesting matter is Petty's own outline of what the science of statistics should properly include. He is by no means satisfied by mere vital statistics. He makes a strong plea for the collection by the State of exact information on the condition of trade, commerce and agriculture. He was, I believe, the first to recommend the institution of general meteorological observation. As far as possible he tried to remedy the insufficiency of his own information. Aubrey, in his history of Wiltshire, records that at Petty's desire he had collected information on the following heads: Price of corn, rent of land, taxation, poor rates, number of lawyers, fairs and markets.¹

¹Cf. "Memoir of John Aubrey," by Britton, p. 94.

CHAPTER IV.

LAND—LABOR—VALUE—RENT.

[NOTE.—The following abstract was made before the publication of Dr. Cunningham's second edition of his History and also before I had seen Ricca Salerno's essay on "Idee finanziarie del Inghilterra" in the *Giornale degli Economisti*, 1884. Pages are quoted from collected edition of Petty's works, Dublin, 1769.]

In the "Treatise on taxes and contributions" Petty says that labor is the father of wealth, and land the mother (31). This expression offers us a convenient division. We will first of all gather together his statements on land itself as a factor in national wealth.

The destiny of a country is decided by the territory which it occupies. The richness of the soil enables it to support a large population; to use his own words, "A thousand acres that can feed a thousand souls is better than ten thousand acres of no more effect" (219). In a limited territory all government charges are smaller. There is greater division of labor, hence greater opportunity for acquiring wealth (219). Certain countries have natural advantages in manufactures and in trade (220). Holland is flat. It is naturally adapted for windmills (220). The fact, too, that it is placed at the mouth of three large rivers all flowing through rich countries, keeps in its hands the lucrative navigation of those streams (221). Proximity to navigable waters, by diminishing the cost of carriage, gives one country an advantage over another not so placed. Again, if a country can be easily defended against foreign enemies, it saves on this head much expendi-

ture of money (218). A conspicuous case of the fortune of a city being determined by natural location is pointed out in London (27 and 28). It will always be the greatest city in England, because the Thames is the most commodious river in the island, and because London is placed on the most commodious part of the Thames. The situation of Ireland proves that it is naturally adapted to trade with America, for in the southwestern part of that island the most commodious ports are found (354). Petty believed that these natural differences might be expressed in exact language. In addition to comparative meteorological observations, he proposed that the natural advantages of different soils should be mathematically estimated by agricultural experiments (335).

The main factor in the creation of wealth is labor. Without it natural advantages are insufficient, and by it natural disadvantages can be overcome. Ireland, he points out, has many natural advantages. Why is it such an undeveloped country? He answers by declaring that the Irish themselves "are unprepared for trade" (354), because their necessities are few. They want no foreign commodities but tobacco. Where there is no internal trade, there is no incentive to labor. "Husbandmen, seamen, soldiers, artisans and merchants are the very pillars of any commonwealth; all the other professions do rise out of the infirmities and miscarriages of these" (223). In these different forms labor has not the same value. More is to be gained by manufactures than by husbandry, and by merchandise than by manufactures (220).

In the highest place in the scale of labor is the seaman. "Every seaman," he says, "is not only a navigator, but a merchant and also a soldier." The wage of a husbandman is only one-third of that of a seaman. Holland is the model commonwealth, because in Holland there is little plowing or sowing of corn or little breeding of cattle. They have rid their hands of the "old patriarchal trade of being cow-keepers" (232). As the trades and arts increase so the trade of husbandry will decrease. It would be advantageous, if the husbandmen of England would become tradesmen (233). Cattle and corn could be imported from other countries.

We see from these views that, when labor is said to be the father of wealth, we must understand the expression in a limited sense. Labor can be employed in two ways, either in order to local wealth or to universal wealth. Under the last, he understands shipping and merchandise, to which he gives the preference. Under local wealth he reckons the building of houses, planting fruit trees and timber land, inclosing common land, works of defense, the building of work-houses, construction of roads, making rivers navigable, erection of factories of various kinds (310). The ultimate effect of labor applied to the production of universal wealth is "abundance of silver, gold and jewels, which are not perishable nor so mutable as other commodities, but are wealth at all times and in all places." "The labour of seamen and freight of ships is always of the nature of an exported commodity, the overplus whereof, above what is imported, brings home money" (224).

Petty's reason for assigning these advantages to labor applied in the production of non-perishable goods is political. He believes in a strong government. He wishes to strengthen the hands of England against her foreign neighbors and set her above possible attack. In the short tract entitled "*Verbum Sapienti*," he answers an imaginary objector, who asks, Is this untiring industry to be unending? It is to continue, he says, until "we have certainly more money than any of our neighbour states" (488). This principle he consistently applies to all forms of activity. He asks, Does such labor "enrich the kingdom?" (486). In order to procure money for public uses people must either work harder or introduce labor-saving processes. The great misfortune of Ireland is, as we have seen, the simple life led by the natives. They need so few goods. It would be well to beget in them a taste for luxury in order to make them spend and, consequently, earn more. Splendor, art, and industry will be increased "to the great enriching of the commonwealth" (356). Holland—so frequently held up for imitation—has become what it is by its large share in foreign trade (225).

A country with a large population is much richer than a thinly-settled country. He disapproves of the New England colonies, because human labor is wasted there (266). He is fertile in devising plans for making England more populous; *i. e.*, increasing its labor power. He does not wish to see Ireland sunk under the sea. He did not want to destroy its population, but he was most earnest in proposing the transplantation of all the native Irish into England (253). With equal consistency he proposed to depop-

ulate Scotland for England's benefit, and advised the recall of the colonists from America (269).

When Petty treats of the advantages which result to a country from great cities we find how far he carries his arguments in favor of a dense population. Granting that London be seven times larger than it is, would it be more difficult to provide it with the necessaries of life (113)? He thinks not. Meat and drink can easily be brought from a circle about the city, extending not more than thirty-five miles from its limits. Fuel and timber can be as readily provided as at present. Such a city can be defended at a smaller cost than if its inhabitants were scattered. It would be less open to dangers from factions and rebellions. The charges of administering justice, of maintaining religion, would be less. The cost of collecting taxes would be diminished, and their amount larger. If there is no distinct gain in foreign commerce there would be certainly no loss. The gain by manufactures will be increased, because they will be greater in quantity, and better in workmanship. For, he says, "each manufacture will be divided into as many parts as possible whereby the work of each artisan will be simple and easy. . . . In the making of a watch, if one man shall make the wheels, another the spring, another shall engrave the dial-plate, and another shall make the cases, then the watch will be better and cheaper, than if the whole work be put upon any one man" (116). A large city has a further advantage. The cost of carriage and freight on manufactured goods falls away, when the goods are made in the place, where they are shipped. All kinds of improvements in the arts, all educational reforms, are favored by density of population.

The security of the state depends on its wealth. Its wealth depends on productive labor. So its policy should be directed to seeing that its subjects put forth their energy to the best advantage. The first duty of an enlightened state is to know its condition. Hence follows the need of statistics. All unprofitable work should be discouraged. The number of those seeking the various learned professions should be limited. (12). It would be easy to find out how many lawyers, doctors and priests are needed. The state control of education, with a rigid selection of those fitted to serve in these capacities, would do away with the evils of parental caprice. The legal system should be simplified in all its parts, in order to diminish a class of men whose gains are like those of gamesters, because their labor produces nothing. The principles of the criminal law ought to be modified. The state should remember that, by killing any of its members, it punishes itself. Pecuniary fines, or a state of slavery which gives the state control of the criminals' labor, should take the place of the ordinary penalties (60). The religious policy of the state ought to be guided by toleration. He cites many examples to prove that heterodoxy and trade go together (227). He commends Holland for offering a refuge to the persecuted, and thus increasing her wealth. So, too, the whole system of taxation should be directed towards encouraging productive industries. The trading and manufacturing classes should be carefully treated (22). On the other hand, the unproductive classes should bear the greatest burdens. Their property can only be made productive by changing hands. Beggars and idle

persons should have work provided for them by the state (14). Their work might be looked upon as unproductive. Yet as crime is so largely due to idleness, the charge of the criminal classes—the menace of the state's security—would be reduced. All public works and internal improvements could be systematically carried out by using the labor of the unemployed classes. The educational system should be placed under the control of the state. Its whole aim should be directed to develop human energy and human skill. Education which confines itself to the study of unprofitable subjects is only a preparation for a merely speculative life, and is consequently worse than useless. The maintenance of industrious habits, even at an apparent cost, is insisted upon (48). If a certain industry becomes temporarily unprofitable it should not be discontinued. Those employed in it may by inaction lose their aptitude for labor. He cites with approval the case of Norwich where children were employed, and proposes that child-labor should be introduced into other parts of the country (276). Labor, then, is the corner-stone of the prosperity of the state. He does not forget to assure us, however, that a millennium may come when such forms of human activity may pass into something higher. In this happy time man can follow the end for which he was created—the cultivation of the powers of the intellect (488).

Now that we have treated of both factors, land and labor, which create national wealth, the next thing is to determine their relation to one another. An equation between land and labor is "the most

important consideration in political oeconomies'' (344).¹ This equation will be an expression of value. Labor not only creates value but it is the measure of value. He uses the following illustration: "Let a hundred men work ten years upon corn, and the same number of men the same time upon silver; I say, that the neat proceed of the silver is the price of the whole neat proceed of the corn'' (30). The natural rent of land is the proceed of the harvest minus the food and necessaries of the laborer. The value of this in money is the amount of money a man can save in the same time over and above his expenses while mining silver during the same period of time.

In a later work, the "Anatomy of Ireland," he makes another attempt at expressing the value of natural rent. With the one I have already given he is discontented, because in it he has introduced the factor "labor," which should have been kept out. This difficulty he avoids in a curious way. Natural rent is expressed in the terms of the commodities raised upon the land—butter, cheese, corn and wool—whatever they may be. For accuracy, he makes the following supposition:² "Suppose two acres of pasture land inclosed, and put thereunto a weaned calf." Suppose this animal to become one hundred pounds heavier. A hundred-weight of such flesh he supposes to be fifty days' food. This amount and the interest on the value of the calf is the value, or year's rent of the land. If a man's labor can make the said land yield sixty days' food, then that overplus is the value of the man's labor or wages, both being expressed by

¹This expression has escaped the notice of Dr. Cunningham "History of English Industry," p. 232.

²Cf. Loria "Analisi della teoria capitalista," ii, p. 170.

the number of days' food. The day's food is the common measure of value (345). By the expression *day's food*, he understands the hundredth part of what one hundred men, "eat so as to live, labor and generate." The food is the easiest got food in the respective locality. An ounce of silver is equivalent to a day's food in Peru; the same amount in Russia is equivalent to four days' food by reason of freight and hazard of carrying it thither.

He ingeniously applies this equation for finding the value of labor-saving inventions, for expressing mathematically the ratio between demand and supply in artistic work, and claims that it can be extended further.

In the last essay on Political Arithmetic he gives us an insight into the method by which he reached this principle. "If there were but one man living in England, then the benefit of the whole territory could be but the livelihood of that one man. But if another man were added, the rent or benefit of the same would be double for if a man would know what any land is worth, the true and natural question must be, how many men will it feed" (252)?

Hitherto we have been confining our attention to what Petty calls intrinsic value (37). The extrinsic or accidental value is much more difficult to estimate. Roughly speaking, the extrinsic value of land might be given by taking the average of all bargains made within a definite period of time (36). An analysis of the causes which bring about the fluctuations in supply and demand should, however, be made. Why is it that rents in Ireland are lower than they are in England? He explains the difference by assigning for it the following causes (32): Rebellions, uncer-

tainty of legal title, paucity of people, absenteeism, bad administration of justice. The rent of land will fall when trades and arts increase (233). This may be only temporary, for people who live in towns spend more commodities, and make greater consumptions, than when they lived more sordidly (256). Great need of corn raises its price, and consequently the rent of the land on which it is grown. "If the corn which feedeth London . . . be brought forty miles thither, then the corn growing within a mile of London . . . shall have added unto its natural price, so much as the charge of bringing it thirty-nine miles doth amount unto" (35). Again, the rent of land near populous places will increase by reason of the pleasure and honor of having land there. In different countries the rent of land will differ, according to the natural, civil and religious *opinions of the people living in the country* (37).

The wages of labor and the rent of land vary inversely. If the wages of labor get a larger share of the product then rent must fall (233). We have already seen from his experiment for finding natural rent what he understands by the natural wages of labor. As he estimated in a rough way the extrinsic value of the rent of land, so the value of each individual as a labor unit might be had by using the ordinary or average price for a slave in the markets of the East. There is, however, a more exact way. Suppose the people of England be 6 millions and the expense annually per head 40 millions. Let the yearly rent of land be $7\frac{1}{2}$ millions, and the profit on personal estates be the same, *i. e.*, together 15 millions. It is obvious that the difference between 15 millions and 40 millions has been created by the labor of the peo-

ple (476). The mass of mankind are worth 20 years purchase, as well as land. This whole sum, divided by six millions, the number of people, gives the value of each individual—£69. Natural dearness or cheapness depend upon the amount of labor, for all wealth is the creation of labor past or present (477). This does not imply that the laborer is to receive all the profits. He quotes with approval the statute fixing the rate of wages, and desires that it should be adapted to the change of times (39).

Petty's distinction between intrinsic and extrinsic value is explained in a manuscript dialogue on selling diamonds, from which I take the following extract: "I will first take notice that the dearness and cheapness of diamonds depends upon two causes; the one intrinsic, which lies within the stone itself, and the other extrinsic and contingent such as are (1) the prohibitions to seek for them in the countries from whence they come. (2) When merchants can lay out their money in India to more profit upon other commodities, and therefore do not bring them. (3) When they are bought, upon fears of wars to be a subsistence for exiled and obnoxious persons. (4) They are dear near the marriage of some great person, where great numbers of persons are to put themselves in splendid appearances. For any of these causes, if they be very strong upon any part of the world, they operate on the whole. For if the price of diamonds should rise in Persia, it shall also rise preceptably in England, for the great merchants all the world over do know one another, do correspond, and are partners in most of the considerable pieces, and do use great confederacy and intrigue in buying and selling them."

CHAPTER V.

MONEY AND TAXATION.

Money is defined as the uniform measure and rule for the value of all commodities (346). This is only a definition, for he expresses a doubt whether there has ever been such a measure (30). The world measures commodities by gold and silver, but these measures do not fulfil the conditions of a real measure of value. In the first place they are not natural measures. The proportion between corn and silver gives an artificial value, because the comparison is between a thing naturally useful, and a thing in itself unnecessary (81). Again, it is not a constant measure, for the value of silver fluctuates. It is worth more at one place than at another, not only from being further from the mines, but from other purely accidental causes (345). It may be worth more at present than a month or other small time hence, or it may be converted into a commodity. Vessels will be made of it if more commodities can be exchanged for it in this way than by employing the same silver by way of trade. Only one of the two precious metals is "a fit matter for money;" the other metal is only a commodity (347). The proportional value of gold and silver fluctuates as the earth and the industry of man produce more of one than of the other. The only way of pitching upon the true proportion between them is by reducing each to the amount of labor required in the mining and refining of each. The man who has the ability to hire the most labor is the richest

(38). This helps us to understand the difficulty of comparing the money in a country at the present time with what it was in any past century. We must know first of all the difference in our denominations now and then. Sixty-two shillings are now coined from the same quantity of silver as were thirty-seven then. We should know besides what were the regulations regarding weight, fineness, and seignorage. Even if we knew all these facts, we must have besides its power of purchasing labor, before we can attain to accuracy (38).

“Money,” he says, “is the best rule of commerce” (*Quantulumcunque*). It is an imperishable commodity, and it is exposed to smaller fluctuations in value than other commodities. It is, however, absurd to give too much importance to its possession, for the money of a nation is only perhaps a hundredth part of its wealth (20). The rest consists in lands, housing, shipping, furniture, goods, and so on. Remembering this, there ought to be some way of determining what should be the amount of coin in circulation. The general rule to be followed is that it should only be increased when the general wealth of a country increases. In order to measure it exactly he uses one of his favorite methods of computation. We must know the number of people, the amount of their expense annually, and the customary time of settling their accounts. For example, if the rents of lands are eight millions per annum, and they are paid half yearly, there must be four millions of coin to pay them (279).

Although Petty is careful to tell us that money “is but the fat of the body politick,” of which there can

be too much as too little (481), yet when he considers practical questions of state policy, he assumes the political point of view. As the great need of the newly developing modern state was a well-filled treasury, he advises that the importation of gold and silver should be encouraged (235). Again, in the same spirit, he makes the following remarkable recommendation: "That selling of lands to foreigners for gold and silver would enlarge the stock of the kingdom" (282). On the other hand, he looks upon the prohibition of exporting money as impracticable and nugatory. If it has any effect it acts as a kind of insurance premium, heightening the price of the goods purchased with the money exported in defiance of the law (45). The advantage of permitting the export is to be seen, when we remember that the trader can make much stiffer bargains if he has ready money than if he had commodity alone (46). On practical questions of currency Petty is very full and complete. "If the coinage is of specie of unequal weight and fineness," it is no longer a rule (*Quantulumcunque*). He gives a detailed account of the damage resulting from these inequalities. The money, if full weight and fineness, is sorted out by exchangers, and exported to some place where its real value is recognized (348). He has carefully examined the familiar fiscal expedient of tampering with the coinage, either raising or debasing it. The idea of such a proceeding is "to multiply it and make it pass for more than it did before" (75). This means to purchase more commodities or labor with it. What such a policy amounts to is simply a tax upon the people to whom the state is indebted, or, in plain words, a defalca-

tion. An open bankruptcy is to be preferred. It is a sign of a sinking state "which catcheth hold on such weeds as are accompanied with the dishonour of impressing a prince's effigies to justify adulterate commodities and the breach of public faith, such as is the calling a thing what it really is not" (82). Any coin is debased that has more alloy in it than serves to correct its too great natural softness and flexibility (76). Coin so treated is bad, because it is easily counterfeited. In the case of small coins there is a chance of a great loss if they are depressed in value. A depression of ten or twelve per cent. may equal in this way a depression of twenty-five per cent (77).

Raising money is dividing a pound troy of standard silver into more pieces than formerly, but retaining the same name, or else calling money already made by higher names (78). Supposing then one shilling be called worth two, what would happen? All commodities would be twice as dear. If it were proclaimed that laborers' wages should be the same, or not rise, it would act as a tax upon laborers (78). The only good excuse for raising money is to discourage hoarding.

He then proceeds to discuss a scheme to procure money from abroad by raising the value of foreign coinage in England as an encouragement for foreigners to purchase English goods. The result of the plan would be, that our good money would be drained away. "Raising of money may indeed change the species, but with so much loss as the foreign pieces were raised unto, above their intrinsic value" (79). Even if the export of money could be prohibited, it would be better to lower the price of our own goods. From the political point of view it

might be more judicious to raise the value of foreign coins. We gain in the last case foreign specie, in the other foreign commodities.

Copper and tin money made "*ad valorem*" is not debased. Money to be good need not be exclusively made of gold and silver (76). The number of copper coins ought, however, to be limited to actual necessity of making small change. The tokens used in exchange for retail by particular men are not base, if the credit of those who issue them is good, and if they can be changed for silver.

Finally he takes up the whole question of money exports, and treats it by a new method (*Quant.*). The laws against export of money are not natural. Countries which abound in money have no such laws. Countries that forbid export are alike destitute of money and merchandise. Besides, as we have already seen, it does not follow that a country is poor because it has little money. We know that private individuals thrive without hoarding. They turn their money into merchandise.

Interest is a "reward for forbearing the use of your own money" for a term of time agreed upon (*Quant.*). In another place he calls it a compensation for the inconvenience of not having one's money back "until a certain time to come" (34). There is no reason why the laws should prohibit usury. If exchange is allowed, why should interest be restricted? The two are closely related in principle. Exchange is the reward given for the convenience of having money in the place you wish, and interest is the reward for having it for the time you wish (35). The reason for allowing interest lies in the natural order of things, against which civil positive laws are

fruitless. The rate of interest is determined by the rent of land which the same amount of money will buy, where the security is undoubted. Below this the rate of interest can not fall. When the security of investments is doubtful, it is natural for the rate to be high. This is the case in Ireland. A low rate of interest, which many of Petty's contemporaries looked upon as a cause of wealth, he regarded as an effect of general industrial prosperity. Holland, where the rate was low, had an abundance of money, and this it had secured by an enlightened commercial policy (226).

Exchange he defines as local interest. Its rate is governed by the height of the premium on the risk, and by cost of transport from one place to another (35). Local differences of profit will also modify it. Exchange can never naturally be more than the cost of land and water carriage between the two respective places, and the insurance. Ireland is an apparent exception for the rate of exchange between that country and England is much higher than this principle would allow. This abnormally high rate is the result of the restrictions placed upon Irish trade with England. Goods going out of Ireland to pay bills in England must be taken to the Barbadoes and there sold for sugar. This sugar must be brought to England and sold there. It is easy to see why the rate of exchange has risen to fifteen per cent. (349).

Petty's residence in Holland had made him familiar with the banking system of that country. "The trade of banks," he explains, "is the buying and selling of interest and exchange." (Quant.) Their honesty is enforced by the peril of losing their busi-

ness. The great advantage of the banking system is that it enables a country to diminish the amount of precious metals in circulation as currency. Supposing that £100,000 will drive the trade of a nation, and there is but £60,000 in the country. If £20,000 is sufficient for all payments under £50 then the £40,000 can be placed in a bank and under proper security may be freely used. In this way, with a credit of £40,000, the sum of £100,000 is made up (230). The credit system can be further extended. The security in the bank need not be metallic; why should not money be issued on the basis of landed property (280)? He is convinced of the soundness of such a scheme, and he wishes to see land banks established both in England and in Ireland (351).

Petty's most systematic work is his "Treatise on taxes and contributions." When we remember the desultory character of the English writings on finance in his time, we must be surprised at his firm grasp of the subject. It was a matter in which he was thoroughly at home. As a public servant he had experience in financial administration, and he was a witness of the serious effects that could be brought about by a short-sighted system of taxation. The work opens with an enumeration of the public charges of a State. These are charges of defense, external and internal; administration of government, of justice, of religion; education, the poor, and internal improvements. What are the causes that increase these charges? The origin of foreign and domestic wars is traced and analyzed. The costs of governmental administration may be increased by a general unwillingness to pay taxes. This unwilling-

ness may be due to a suspicion that there is an over-imposition of taxation, or that there is extravagance, or that the levies are unjust. Again, it may be due to enforced money payments at inconvenient times, or to legal difficulties as to right of imposition, or to scarcity of money, or to small number of industrial class, or to the want of proper trade statistics. The charges of religion, education, justice, the poor, internal improvements, are considered in the same thorough way and remedies are proposed for lessening these several burdens.

The road to all reform is the possession of accurate statistics. All unprofitable labor should be limited by an effective State control of education and religion. The labor of every man should be directed to those channels where it will be most productive. The subject of "unwillingness to pay" is more carefully examined—each of the headings previously given is minutely analyzed. As an illustration (18), under the heading extravagance, it is noticed that money spent on entertainments is not really lost, because it descends finally into the hands of those who are engaged in useful trades. The same principle holds with regard to money spent by princes on favorites. No one should object to such extravagance, for there is a chance for every one to become a favorite, no matter how low his station of life may be. Then comes the main subject of the work—the best methods of raising taxes (chapter iv). The most simple method, as well as the most natural, would seem to be to support the government by reserving a certain proportion of the land as royal domain, or to raise the same amount of income by taking a fixed proportion from the rent of all lands. This last is

rejected, because, owing to the uncertain length of leases, the incidence of the tax may be thrown ultimately on the consumer, and in the end it amounts to the same thing as an irregular excise (26). In a new state this objection does not hold good. This is the case in Ireland; there the payment of the royal quit rents is not at all burdensome. "That country is happy in which by original accord such a rent is reserved. * * * * Not only the landlord pays, but every man who eats but an egg, or an onion of the growth of his lands" (25). The introduction of such a tax into England would be unjust. For suppose A and B had each of them a parcel of land of equal goodness and value. Suppose A has let his land for twenty-one years for £20, and B's land is free. Let a tax of a fifth part be laid; hereupon B will not let under £25, that his remainder may be £20. A must be contented with £16 net; nevertheless, the tenant of A will sell the proceeds of the land at the same rate that the tenants of B will. It is easy to see from this that only those landlords will lose whose rents are already predetermined; the rest will gain by raising their revenues and by enhancing the prices of provisions (25-26).

The first method proposed, namely, the system of Royal Domain, is not so good as the second, because in the latter case the king has more security and more obligees (24).

An assessment on housing is open to the objection of inequality. A house may be regarded in two ways, either as a means of expense, or as an instrument of gain. Which of these standpoints will be selected as the subject of taxation (26)? Assessments on rentals, in order that they may be just, should be levied only

when the exact value of the rent is known. This involves a very careful examination, and the whole nature of rent must be analyzed. This leads to a long digression on natural rent, which has already been discussed under that heading.

“Custom (ch. vi) is a contribution or excisium out of goods sent out or imported into the prince’s dominions (41).” Export duties are only advisable in exceptional cases; *i. e.*, when the country has a natural monopoly; as England has in tin. The duty should be regulated to leave a reasonable profit to the exporter, and to make the price of the commodity lower than it could be had from elsewhere. Customs on imported goods should be governed by the following considerations: All goods ready for consumption are to be made somewhat dearer than the same things grown or made at home. Articles of luxury should be highly taxed. Goods not fully wrought and manufactured, tools and materials used in manufacture, should be gently dealt with (43). The objections to the tax are the cost of collection, the incentive to smuggling and to bribery. The amount so raised can of itself never suffice to bear the expense of the kingdom (44). A substitute for customs might be found in tonnage duties. These are easily collected, and the object on which they are laid is visible to everyone. The state might also undertake a general marine insurance. The profits would be great, and there would be no inducement to evade payment (45). Even if such changes were made, it may be said that the officials of customs must be still employed in the same numbers, to prevent the importation of commodities that are wholly prohibited.

This brings us to an important question of commercial policy. We have already seen how he condemns the prohibition on money export. In his "Quantulumcunque," a much later publication, he says: A merchant will carry goods or money according as the one or the other will purchase more commodities. The effect of prohibition on the wool trade he thinks of small use. The Hollanders have "gotten away our manufacture of cloth by becoming able to work with more art, to labour and fare harder, to take less freight, duties and insurance" (47). Fierce retaliation will do us more harm than good. We often buy corn from abroad. Why should we not turn our hands to tillage? By doing this we should increase the price of meat and encourage the fisheries: Less money would be spent on corn; there would be no gluts of wool; our idle hands would be employed in tillage and fishing; or why not draw over workmen from Holland, if their way be better, or send our men there to learn? Two general principles of great importance are in place here. As wise physicians do not tamper with their patients, but rather observe and comply with the motions of nature than contradict it with vehement administrations, the same care should be used in economics and politics (48). Imported goods need not be prohibited until they much exceed our exportations. In the "Anatomy of Ireland" (356), he makes a more explicit statement of his views. "Why should we forbid the use of any foreign commodity which our own hands and country cannot produce, when we can employ our spare hands upon such exportable commodities as will purchase the same, and more?" We have seen the position he took on the prohibition

of the Irish cattle trade. He saw in the prohibition a direct loss to England, for Irish trade was diverted into other channels. She was obliged to import from Spain and France the goods which otherwise she would have taken from England. That the theory of foreign trade was not unknown to him is evident from the following passage taken from the "*Quantulumcunque*". In it he gives his reasons for preferring copper to tin for fractional currency. The ordinary argument for using tin was, that that metal was a domestic commodity, while copper had to be procured from abroad. To buy copper would drain the kingdom of its store of money. This reasoning Petty meets in the following way: If a hundred weight of tin be exported to Turkey it will purchase there enough silk to buy about a hundred weight of copper in Sweden.

We now pass on to the poll-tax (ch. vii). The tax as imposed in England is unjust. It is a tax on position or title, and takes no account of the riches of the individual taxed. Single rich persons are taxed at the lowest rates, while poor knights are rated at £20. A real poll-tax taxes every individual alike. The objection to this form of tax is that it is only apparently equal, men who are of unequal abilities being rated at the same amount. The conveniences are, ease of collection, certainty of amount raised by it, incentive to setting children to work early. The plan of state lotteries (ch. viii) as a fiscal expedient he aptly describes. It is, he says, "a tax upon unfortunate self-conceited fools; men that have good opinion of their own luckiness." It should be under direct state control, and ought to be used

sparingly. Its inconvenience is the small amount that can be raised in this way.

Benevolences (chapter ix) are money raised by forced loan from special classes. Such loans are justified when the classes so taxed have been benefited especially by the State (54). The inconveniences are, dangers arising to the State from factions, increase of bankruptcy, the liability to abuse, because some pay in order to secure personal favor to those in power. Legal penalties (chapter x) are treated under the head of taxation, because if fines were extended to all forms of crime the State's income would be considerably augmented. Every man has a labor-producing power. The State should regard this factor in the administration of the criminal law. Serious crimes should be punished by slavery, minor offenses should be fined. Religious heterodoxy ought to be tolerated, but its adherents must be made to pay for their conscientiousness. Infidels are to be kept at hard labor. The responsibility of defections among the laity from the established form of religion should rest upon the clergy, and their salaries should be taxed heavily by the State in case their flocks show signs of heterodoxy.

Monopoly (chap. xi) is the exclusive right of sale of any article without regard to its real value. A conspicuous example of a monopoly is the *gabelle*, or salt duty. As salt is universally used, the monopoly seems to have the same effect as a capitation tax (64). The pretext for a monopoly is the right of invention. Original inventors, however, rarely profit by their inventions, as generally they fall into the hands of projectors who gain all the profits. All offices instituted by the State with the right of

arranging their scale of fees, where the duties performed are out of all proportion to the charges made, are monopolies. The sale of such offices should be made a source of public revenue.

Tithes (chapter xii) are properly an excise for the support of the clergy paid *in naturalibus*. They are the pattern for a just tax, and seem most equal to defray public charges. So far as raw products are concerned there is no difficulty. But in regard to housing, cloth, drink and manufactured goods, the system cannot be equally applied. The inconveniences are the uncertainty of the amount that can be raised, owing to the variations in the market price of goods; the liability to fraud when the tax is farmed out for collection; the necessity of an additional tax on manufactured articles, that have already paid the tax in a raw state.

Several smaller ways of raising money are then mentioned (chapter xiii). These are: The establishment of state banks, or of *monts-de-piété*; state monopoly of such articles as salt and tobacco; state poor control and guardianship of minors, lunatics and idiots; the maintenance of theatres and places of amusement; birth and death taxes; taxes on Jews and aliens. In under-peopled countries it is not advisable to lay a tax on aliens. On Jews such a special tax can be justified. They deal in lucrative trades and manage frequently to elude taxation. The assessment of an aliquot part on estates, real and personal, is entirely bad. An opening is given to fraud, collusion and oppression. It is impossible to check its fairness or correctness.

The method of raising money by tampering with the currency has been already discussed. The next

tax dealt with is the excise (chapter xv). The principle of equable taxation is, that men should contribute to the public charge according to the share they have in the public peace, *i. e.*, according to their estates or riches. Now, as there are two sorts of riches, actual and potential, which is to be taken as the object of taxation? "Every man ought to contribute according to what he taketh to himself, and actually enjoyeth" (83). The first step is to estimate the total wealth of the kingdom. Its annual yield from all sources that are known must be deducted from the whole known expense. The remainder is the product of the annual labor power of the whole people. The amount to be raised is levied according to the ratio each source of wealth bears to the total wealth. To use an example in the "*Verbum Sapienti*," if the annual proceed of the stock of a nation yield fifteen millions and the labor of the people yield twenty-five millions, then three-eighths of the tax is to be laid on the stock, including land, cattle, personal estates and housing, and five-eighths must be levied on the people by an equal poll-tax (477).

Properly, every article should be taxed when ready for consumption. For example, on corn should be accumulated the charges of grinding, bolting and yeast, unless these particulars can be best rated apart. Domestic commodities should, if exported, pay no excise. Imported foreign goods should pay.

A different form of this tax is called an accumulative excise (85). By this tax many things together are taxed as one commodity; for example, in the tax on cloth, the wool, tools, and workmanship may well enough be included. This principle has been carried

so far as to have all taxable goods accumulated upon some single commodity for ease of collection. Beer has been proposed as the object of this accumulated excise, on the supposition that, as men drink, in the same proportion they make all other expenses. This supposition is, however, notoriously untrue, for observation shows that the poorer classes of laborers sometimes drink twice as much as gentlemen. All things proposed in place of beer, such as salt, fuel, and bread, are open to the same objection. Of all excises, hearth or smoke money seems the best. It is "the easiest, and clearest, and fittest to ground a certain revenue upon." The tax must be small or it may become unbearable. If the incidence of the tax is shifted from the tenant to the landlord, the tax becomes a tax on housing.

The advantages of a proper excise are: "The natural justice that every man should pay according to what he actually enjoyeth." If it be not farmed, but regularly collected, it encourages thrift. "No man pays double or twice for the same thing, forasmuch as nothing can be spent but once." It gives an opportunity for getting an accurate account of the wealth, growth, trade and strength of the nation at all times. The tax should be collected by special officers, whose time will be taken up entirely in this employment. Holland's experience confirms this last recommendation, and in the manner of collecting the tax, her practice should be followed.

CHAPTER VI.

PETTY IN RELATION TO CONTEMPORARY
ENGLAND, AND HIS PLACE IN ECONOMIC
LITERATURE.

Some brief references must be made to the economic environment in which Petty wrote. For the few facts presented here I have relied entirely on secondary sources. They are only offered with the hope that they may illustrate Petty's writings. His tracts were composed with the direct purpose of influencing his own contemporaries. Anything that helps us to grasp his point of view may be useful.¹ When we hear him pleading for the advantage of increased population, it is well enough to remember that in the last half of the seventeenth century the population of England was only five and a half millions. Again, he dwells with undue exaggeration on the necessity of large towns to the prosperity of England. In his life-time the only town of any considerable size was London. The north of England had practically no towns of importance. Compared with the south that part of the country was in an undeveloped state. Roads were everywhere bad. We can understand why he disapproves of agriculture. The land was usually carelessly cultivated, and its product consumed only by the cultivator. Transportation was impossible. Only in the neighborhood of the London market was it profitable to raise corn. What Petty calls the primitive trade of cow-keeping was everywhere else the most profitable on

¹ My authorities are Cunningham, Faber and Macpherson.

account of the ease of transporting live-stock to market. The consumption of flesh, butter and cheese by the lower classes of the population was proportionally greater than in the present century. Owing to this fact it was only profitable to raise corn in proximity to the London market, where it found a ready sale. The counties lying nearest to the great capital were in a much more advanced state of industrial development on this account than the rest of the country. Only one-fifth of the country was in a state of tillage, and even from this small portion of tilled land a disproportionately large quantity of inferior and coarse varieties of grain was raised. Cattle-raising was everywhere else the most profitable occupation on account of the greater facility of transporting live-stock to market. A great quantity of flesh, butter and cheese was consumed by the lower classes.

The woolen industry was still the sole department in which English manufactures had any significance. Every year two million pounds of wool were sheared. In a manufactured state this was worth eight millions sterling. Of this six millions were used in England; the rest was exported. Even here England felt severely the effect of foreign competition. Especially Holland, Petty tells us, had by improved methods and better workmanship become England's rival in supplying the Continent with woollens.

The second source of national wealth, next to the woolen industry, was from the shipping trade. Here, again, despite England's favorable position, she was in constant competition with the Dutch. The Navigation Act, passed by the Commonwealth in 1651, with its subsequent alterations, all in more rigorous

direction, soon bore fruit. In 1663 the tonnage was 421,582; in 1683 it had risen to 884,995. In everything else England plays a very poor role. Mining was hardly developed. Tin, in which England has a natural monopoly, only shows an output of £1,600. Coals found their principal market in London. That city consumed half the amount mined annually. Salt was not a domestic product at all; it was imported from France. Iron manufacture was in a very rudimentary condition. Only 10,000 tons were annually produced.

These figures leave one with an impression of the insignificance of England's industrial position during the seventeenth century, but it is easy to take too unfavorable a view of them. As a matter of fact, under the Stuart dynasty, England was making steady progress. She had survived a civil war, and everything goes to show that in the Restoration period England was beginning to feel her power.

The main lines of policy initiated by Cromwell were followed during this period. I need only to refer to the Navigation Act, the abolition of the Feudal Rights of the crown, the introduction of the excise, all of which were Commonwealth measures, that were sanctioned by the Restoration government. The commercial growth of the country is indicated by the increased tonnage of the shipping.¹ In 1663 there were 95,266 tons; in 1688 the total had risen to more than double the amount, 190,533 tons. The customs duties show the same upward tendency. In 1660 the receipts from this source were £421,582; in 1665, £519,072; in 1675, £674,113; in 1685, £701,504; in 1687, the year of Petty's death, they had risen to

¹Cf. Chalmers, "Critical Estimate of the Nation," reign Charles II.

£884,955. In 1652 the post-office was farmed for £10,000 per annum; in 1663 the sum was more than doubled. In 1685 the revenue from the post-office was estimated at £68,000. The postage on letters was considerably reduced, and by private initiative the first penny post was established in London in 1683. In 1661 a statute was passed for repairing highways, and two years later toll-gates were first established for their maintenance. The reform of the poor law administration was widely discussed. At the close of Charles II's reign the poor rates equalled £665,000. A new departure was inaugurated at the commencement of his reign by the erection of work-houses.

The foreign trade of the country was still in the hand of trading companies. The management of these organizations was an object of great debate. The East India Company met with strong opposition by those who disapproved of the exclusive form which its monopoly took. The older companies, especially the Eastland, were complained of as setting limits on the natural growth of English commerce, although their management gave fuller play for individual effort. The age of the Restoration is also remarkable for the consistent development of the protective system. On the one hand we meet with a succession of commercial treaties with different powers, by which England attempted to gain some special advantages in the extension of her trade that were not open to France and Holland. On the other hand there are a series of measures intended to protect the home market and national trade. The Navigation Act was made by successive changes much more rigid in its terms. The premium on the build-

ing of English shipping was increased. Jealousy of France, from which England imported extensively manufactured articles, wines and liquors, prompted in 1678 the passing of an absolute prohibition of all French goods. It was urged against the East India Company that the articles which it imported into England, muslins and calicoes and wrought silks, were highly injurious to English manufactures. Finally all these Indian goods were absolutely prohibited. Every effort was made to preserve the woolen trade. The prohibition of the export of raw wool had never been very effective. This measure was made more rigid, and in order to extend the sale at home the famous order was passed which forbade bodies of the dead to be buried in any other material. Dr. Faber has carefully examined the influences which brought about the application of protective measures in favor of the agricultural classes. I can only notice here that the Restoration is a crucial period in the history of the Corn Laws. The two great principles of prohibition of import, and bounties on export, were inaugurated in this time.

A subject which has not received adequate attention at the hand of historians is the financial history of England during this period. Mr. Buxton, in his "Finance and Politics," lays stress in the preface of that book on the close connection between finance and the constitutional development of England in the seventeenth century. The Civil war, largely brought about by irregular taxation, was the cause of a great increase in public expenditure. In order to meet new demands, new methods of taxation had to be devised. Among the most important measures was the introduction of the excise in 1643. And it

is equally necessary to remember that the whole system of financial administration—previously in a most crude state—was reorganized by Cromwell.

The fiscal point of view in the so-called mercantile system is too often ignored. The problem before the men of the seventeenth century was to provide for an increase of national income. The modern national state, with its enlarged sphere of activity, was struggling to supply its coffers by forms of assessment that had come down from the middle ages. The most direct way of accomplishing its purpose, with the smallest danger of exciting rebellion, seemed to be the adoption of the protective measures which we have already enumerated.

This brief review of the economic condition of England gives us a background for Petty's writings. They can only be understood and appreciated as interpreting the questions of his own day; and in the light of the questions of his own day they are most worthy of study.

There is another point of view—rather wider—from which we can regard his work. What place does he hold in the development of English economic literature, as a whole? Some answer to this question I have tried to give by using an arrangement in my paraphrase of his writings that might help us to seize the salient points. A more satisfactory answer can be made when we come to examine his method of thought in relation to his own age, and when we have traced its affinity to the system of Ricardo and Adam Smith.

We have seen from Petty's life that he was an avowed adherent of the new philosophy. He speaks with respect of its founder, Bacon. He had assisted

in the founding of the Royal Society, which was devoted to the study of natural science and to the extension of the experimental method of research. What evidence do we find in his works of the influence of the Baconian philosophy? In the preface to the "Anatomy of Ireland," he cites "the judicious parallel" of Sir Francis Bacon "between the body natural and the body politick," and calls his own work the first essay of political anatomy. In his early work on education we find him stating that "the only true method is the method of observation and experiment." A good illustration of the method he here commends is to be found in the "Quantulumcunque." In arguing against the wisdom of forbidding the export of money, he says: Countries which forbid the export have no money; countries which place no restriction on the export are rich. Careful observation and analysis are characteristic of his writings.¹ Petty was familiar with two continental countries—Holland and France. In both of these countries he had been an intelligent observer. In Ireland his long residence had made him acquainted with a state of culture different from any that he had met elsewhere. His powers of observation are trained enough to discriminate between what is essential and what is not essential in whatever he is investigating. Petty believed that scientific experiment ought to play a greater role than it did at his time as a guide to industrial progress. He did not confine its sphere solely to the arts. We have seen his proposals for its application to agriculture. To experi-

¹ Dr. Cunningham well says that in these respects he shows more power than in deduction.

ment in navigation and land carriage his own time and money were devoted toward the close of his life.

Petty's obligations to the Baconian method are apparent, but they are not so noticeable as his obligations to Hobbes. It is true that Bacon's name is mentioned, and it is also true that no reference is ever made to Hobbes. But it is certain that Hobbes exerted a much greater influence than Bacon over him. In Petty's biography we have seen his early association with Hobbes. This association did not end with Petty's residence in Paris; their friendship remained unbroken. In the contemporary life of Hobbes by Aubrey, in the list of Hobbes' most intimate friends, Petty's name is found. Although Petty depreciated reading, and had rather a contempt for book learning, we know that he was acquainted with Hobbes' works. In a (MS) list of books drawn up by Petty for his son's use, the "De Cive" of Hobbes is the only English book mentioned. Petty's predilection for mathematics is an evidence of the intellectual kinship between Hobbes and himself. Petty follows Hobbes in assigning to mathematical proof the highest place. In the preface to his last "Essay on Political Arithmetick," he says "observations expressed by number, weight and measure" are the data he uses. And, again, "I have taken the course . . . to express myself in terms of number, weight or measure, to use only arguments of sense" (207). Mathematical proof has the greatest certainty, and as the great aim of investigation is to reach certainty, mathematical reasoning is to be extended as far as possible. We have seen the good results of this principle when Petty took in hand the Bills of Mortality and made them the

basis of the new science of statistics. But his consistency did not stop there. His works are full of mathematical computations of a more complex nature.

At this point we must make a distinction. In his purely statistical work it is unjust to criticise results when they are due solely to the want of accurate information. He was conscious of the imperfect sources which he was obliged to use, and he did all in his power to secure trustworthy data. It is quite another thing to object to the method itself, and this in many cases we can fairly do. For example, granting the correctness of his estimate of the population of England, his assumption that the population of a country always increases in the same ratio (107) is one whose falsity he should have seen. Again, in elaborate computations he uses the words "guess" and "suppose" frequently, showing that the whole argument is purely conjectural. Yet he does not hesitate to use such arguments to guide the policy of the State.

Petty's preference and constant use of the deductive method may also be regarded as a sign of Hobbes' influence. In many cases it is difficult to say whether he employs facts simply as illustrations or whether they have been used inductively. I should be inclined to say that the number of purely fictitious illustrations invented to prove or explain general principles, shows that he most frequently used observation to fortify a principle, which he had reached deductively. Taking his great principle that value is determined by labor, it can hardly be said that he derived it from observation. He seems to have worked it out independently, not taking the

trouble to find out whether it was objectively true. When he asserts that the price of silver in Russia and in Peru is determined simply by the quantity of labor, it is almost certain that he confidently uses this illustration, without investigating its truth. Statements such as these are—purely *a priori*—he is constantly making without being aware that they are less trustworthy than what he reports from his own observation in France or in Holland.

As deductions of this kind have played so large a role in the science of economics, it is interesting to scrutinise them in the pages of Petty's works. His employment of deductive method is concerned in reducing complex facts to simplicity. He only means, he says, to consider "such causes as have visible foundations in nature." He does not intend to consider those causes "that depend upon the mutable minds, opinions, appetites, and passions of particular men." And again, he states that he only uses "arguments of sense."¹ This gives his conception of nature. In order to reach certainty we must leave out all the causes which he has particularized as depending on the mutable properties of human nature. When we analyse these, we must disregard them, and what remains will be in every case the natural state of the object investigated. He shows how he applies this method in detail in the case of rent. The accidental causes which affect rent are enumerated. These are: public security, good administration of justice, pleasure and honor of having land, better titles, size of population. When all these have been accounted for, the only factor left is the land itself; or in other words, the indestructible powers of the

¹ Preface to last "Essay in Political Arithmetic," 207.

soil are what give rise to rent, and when we have found some way of arithmetically estimating these, we have reached an expression for natural rent. In the same way, but not so fully worked out in his writings, he reaches expressions for natural price, for natural measure of exchange, natural rate of wages (338). In the case of interest his use of the word *nature* is instructive because the advocates of prohibiting usury from Aristotle down also appealed to nature. Money was by nature unproductive, and no charge could be made for its use. Petty takes a directly opposite position. When he says interest is a reward or recompense for forbearing the use of your money, he assumes the contradictory of the mediæval view. There is always a productive use for money. It can be invested in land, and the rent of land gives the standard for the natural rate of interest.

It is clear that Petty's studies in natural science had a great influence on his conception of nature. His method is indeed from Hobbes, but in his conception of the validity of natural laws he diverges from that thinker. Petty shows decided traces of that reverence for natural conditions which characterizes Locke and the philosophic school of the next century. If one has an optimistic view of nature it is probable that one will use arguments against the existing state of things, if they seem to violate the natural order. Petty's writings show evidences of this tendency. He tells us it is against nature to prohibit the export of money (*Quantulumcunque*). In another place (35) he remarks that "making civil and positive laws against the laws of nature" is vain and fruitless.

It is evident that Petty was no stranger to the political ideal of Hobbes. In the "Treatise on Taxes" we are put in the way of tracing Petty's own conception of the functions of the State. The widest interpretation is given to its powers. There is no limitation to its interference. In education and in religion, it stands supreme over the individual. The subject has a subordinate position. He must be treated with an enlightened policy, because the prosperity of the State is dependent upon the prosperity of the subject. Every man is valuable because he represents a certain fraction of that labor power by which the State is enriched. The State should take care in no way to impair this energy, but at the same time it can interfere to secure the benefit to itself of the labor of its subjects.

Whenever Petty speaks on religious subjects we are conscious of a cynical strain in his thoughts. He uses the canting terms of his Puritan friends in an ironical way (3, 62). In the same sentence he significantly joins together ale-houses and monks, recommending that in Ireland the number of each should be diminished. In his will he again betrays Hobbes' influence, where his words mean that the authority of the state in religion is supreme; and in other places he recognizes no individual right in matters of conscience, against the state. An extension of this characteristic is to be found in his complete disregard of any principles of public morality. The obedience of the subjects of a government depends on the power of their rulers to reward or punish them (2). In his tract on Naval Philosophy he calmly asks the question whether it would not be better, instead of employing seamen in trade, to use the same num-

ber on the high seas to take prizes from those with whom we are at war. Would not the commercial value of the prizes be greater than the proceeds of legitimate trade? He argues with great complacency on the possibility of transporting the whole population of Ireland into England. He would erect his whole educational reform on a ground which must have been subversive of all family life. The members of all the professions, and the official class, were to be recruited from children educated in asylums and schools under the care of the state. In his fearless consistency in carrying out an enlightened sensualistic principle to its extreme, he can be compared with the great Italian political writer of the sixteenth century. Outside of moral questions he shows a certain narrowness of mind. The origin of this defect is to be sought for in the facts of his own life. He was a successful man, and from the road by which he had himself attained wealth he could not allow any divergence. To the claim of culture his training had not inclined him to be sympathetic. Masson, in his "*Life of Milton*,"¹ has remarked on the great difference between the educational reforms of Petty and Milton. Both men were alike dissatisfied with the prevalent methods of education; both approved of radical reforms. But the line that Petty followed in his proposals is far less broad and humanizing than that of the poet. He boasted that he had read almost nothing since he was twenty-five years old. He had few books himself, and in a letter to Boyle he discourages the habit of excessive reading, and questions its value. In the preface to the "*Anatomy of Ireland*" he laments, as Bacon has done in the

¹ Vol. iii, 655.

"De Augmentis," the excessive number of books that were being sent forth. Whether he read the classic writers whom he mentions may be uncertain. It is interesting to see that he selects from Aristotle three books, which Hobbes himself recommends as alone valuable. In his printed works the only important names we find are those of Bacon, Des Cartes, and Sir Thomas More.

His deficiencies of character and intellect he is always ready to reveal. There is no hypocrisy. He has great self-confidence. Whether we find him publishing a list of cheap experiments for the use of the Dublin Society, or whether we find him estimating the value of each individual, he never assumes an apologetic tone.¹

Apart from his value as an economist, Petty must be given a high place among the political writers of his age. His remarks are generally judicious. He interprets clearly the meaning of what he saw about him. His digression on the growth of London is a proof of his shrewdness in foretelling the continued westward progress of that city. Equally far-sighted is he, when he indicates the probability of the separation of the American colonies from the mother country (263). As an authority on Ireland his value is testified by the respect with which he meets from those who have handled Irish history. His argu-

¹A characteristic trait was, we hear, the cause of his failure in the experiments of ship-building, which gave him so much disappointment in his later years. "The cause of the tenderness (of the boat) was an endeavor, besides to introduce a new principle, to make a small passage boat of twelve feet broad, yet enough to carry horses, hoping to have gotten some small matter thereby to have defrayed the charges." From a letter quoted in a life of Petty in "*Biographia Britannia*."

ments for the Act of the Union between England and Ireland are forcibly expressed. When a century later the Union was accomplished, its promoters reproduced much that Petty had already brought forward. His attitude toward the native Irish cannot be called sympathetic. Yet it was an intelligent attitude. He was not indifferent to Ireland's troubles. He had studied the needs of the people. The policy which he regarded as best for Ireland was, as we might expect, in the interest of the English settlers. It was, however, a well defined and enlightened policy. It was the result of careful consideration, not a blind following of racial and religious antipathy.

We have traced in a general way the debt Petty owed to Hobbes. We believe his influence is apparent chiefly on Petty's method and in the characteristics of his thoughts. It is possible to find actual resemblances; for example, in the analysis of wealth into land and labor.¹ But I do not think that verbal identity is so likely to prove Hobbes' influence over him as does the kind of affinity upon which I have already commented. Petty is hardly the man who could be a mere copyist.

In Sir William Temple we meet with a political writer who can well be compared with our author. His tracts on the Low Countries and on Irish trade deal with subjects treated fully by Petty. When two very intelligent men are both reviewing the same ground, it is probable that we shall find remarks in one easily paralleled by the other. The smallness of the Irish trade, Temple tells us, is due to revolutions, political intrigue, bad government and

¹ Cf. Roscher's remarks on Hobbes in his already cited essay.

absenteeism.¹ All this is familiar, but we look in vain for the peculiarities of Petty. There is no use made of statistical information; there are no attempts to interpret the facts in any but the ordinary way of intelligent observation. I can find nothing in Petty's works which induces me to believe that he owed anything to his temporary connection with Harrington's Club, in 1659. To a man of Petty's way of thinking Harrington's learned historical disquisitions would carry little weight. His political system was too speculative to find favor with the practical bent of Petty's intellect.

With Sir Joshua Child Petty can be more justly compared. They both were strongly practical men, but Petty's scientific acquirements place him on a level which Child, with his mercantile interests, never reached. Child, when he holds up Holland as a model, is only doing what every one did who was surprised at the rapid progress of that country in the seventeenth century. Sir William Temple approached this subject in a much more scientific spirit than either Petty or Child. In his "Observations upon the United Provinces of the Netherlands," he shows that he appreciated the necessity of studying the unique position of Holland in the light of her historical development. In the very point where Child reveals superficial treatment by exaggerating the importance of a low rate of interest, Petty is immeasurably above him. Petty knows well enough that a low rate of interest is an effect and not the cause of industrial prosperity. Child indeed shows ability in his treatment of the balance of trade. He saw the impossibility of test-

¹Cf. Essay on Advancement of Trade in Ireland.

ing the welfare of a country by simply looking at the table of exports, and ingeniously pointed out the sources of error. In the controversy between the East India Company and its older rivals Petty had no share. In the dispute Child wrote as a partisan of the East India Company. Petty approved of trading companies, but he says nothing on the merits of either form of organization, joint stock or open companies.

Samuel Fortrey is once mentioned by name. With Fortrey's crude notion of estimating England's wealth by the quantity of coined money in the realm Petty disagreed. The controversy that arose over the supposed decadence of England called forth one of Petty's Essays on Political Arithmetic. He only notices the group of writers whom Fortrey represented to condemn their whole position as fallacious.

The economic works of Mun and Locke fall outside of Petty's lifetime. With Mun (*Posthumous Treatise*, 1662) there are resemblances. His reasons for allowing the export of money are re-echoed in Petty, and his proposal of a State treasure is virtually approved of by Petty's arguments. The many proposals for poor-law reform noticed in the first volume of Eden testify to the fact that Petty's own remarks on this topic are by no means original. In fact, whenever Petty takes up this question he betrays his acquaintance with More's great work, nor are his direct obligations to any other author so apparent.

In these respects where Petty touches the economic thought of his time, and where he reproduces it, he cannot be said to reveal his greatest strength. In the method which he adopted, in the way he

pointed out for a minute analysis of facts, he stands unique. His contemporaries, as a rule, worked in a popular way. They never looked at economic phenomena as a whole. They did not try to penetrate beneath the surface of what they saw. Petty apprehended his subject in a different spirit. He believed that his investigations ought to be guided by a rigorous method. Notwithstanding the occasional character of his works, they show evidences of systematic care in their production. His "Treatise on Taxes" is a much more ambitious attempt to grasp the science of finance, than can be found in any work of his contemporaries in England. The "Anatomy of Ireland" must also be praised for its breadth of conception, although, as he worked it out, there is too much of the political pamphleteer and of *ex parte* argument in its pages.

In Petty there are two elements strongly marked. He shows himself in many ways distinctly under the limitations of his own age. To the prejudice and feeling of his contemporaries, he concedes a great deal. As a politician he is distinctly connected with the age of the Restoration. But there is throughout his writings a more permanent element; an element in which the systematic school of political economy is foreshadowed, both in its method, and in its point of view. In his application of statistical data, in his desire to widen the realm of knowledge by principles of research approved in the sciences, he is the father of English economic science. In his attempt to mark out the road by which the whole field of economic phenomena was to be approached, in his laying down what method was to be followed in analysing economic facts, even in some of the re-

sults he himself attained, he brings himself into close contact with the school of Adam Smith and Ricardo. McCulloch, in his "Literature of Political Economy," has already pointed out an anticipation of Ricardo's doctrine of price, which he had noticed in Petty. Petty quite as strongly as Ricardo insists that labor alone enters into price. Any attention to capital was almost entirely out of Petty's view, but in the "*Verbum Sapienti*" he expressly says that the stock of a nation is the result or effect of past labor. Again, as to rent, Petty would quite agree with Ricardo's definition of rent as the payment for indestructible powers of the soil.

Leaving these verbal likenesses out of the question, there is a distinct intellectual affinity between Petty and Ricardo. In both we see the results of a mathematically trained mind. They both aimed at applying the rigorous method of that science to the study of social phenomena. Both were men who had made large fortunes. In both their practical training had not been supplemented by the broadening influence of education. Petty, like Ricardo, regarded man solely as a labor unit. He, as well as Ricardo, is open to the reproach of dealing with human beings as if they were nothing more than algebraic symbols. Petty's very frank attempt to discover the value of each human being is only a crude example of that insensibility, which might find its parallel in Ricardo's more refined arguments. The differing conditions of their respective times naturally creates a divergence between them. Petty's political ideal was antagonistic to Ricardo. With Petty the vital question is how to make the State rich and powerful. Ricardo was purely individual-

istic. It must of course be remembered that in Petty's days the problem of distribution had as yet really not arisen. The revolution caused by machinery had not altered the face of the industrial world. Allowing for all this, it must, I think, be conceded that in a remarkable way Petty reproduces under a seventeenth century garb those features of Ricardo's work, which have exerted so potent an influence on English thought in this century. Finally, it is extremely curious to compare Petty's tendency towards using fictitious illustrations to explain a general principle, with Ricardo's employment of the same sort of help. Petty here deviates from the rule he had set himself, of always relying on accurate facts, and what is especially important to notice, in so doing he is overcome by the superior clearness and cogency of deductive reasoning, and, like Ricardo, gives to these illustrations the force of objective reality.

Only an enthusiastic person, whose studies have led him to exaggerate the object of his investigation, would be bold enough to speak of Adam Smith being anticipated by Petty. A treatise is different from a tract. Recognizing the wide divergence of aim, method and talent, it is nevertheless fair to point out that some of the principles which Smith used in elaborating his work are already existent in his predecessor. It is in itself important that Smith almost uses Petty's own words when he says that the real wealth of a country is the annual produce of its land and labor. When Dugald Stewart states that the great and leading object of Smith's speculation is "to illustrate the provision made by nature for a gradual and progressive augmentation in the means

of national wealth, and to demonstrate the most effectual plan of advancing a people to greatness," he is correct in indicating that Smith's strong point lies in the extensive field of historical illustration, which he makes use of in the course of his book. In the appeal to nature he was only following previous writers, and also in his conception of nature he cannot claim originality. Petty, like Smith, professedly dealing solely with social phenomena, approaches his work with the same optimistic conception of nature, and uses the test of obedience to natural laws with a like confidence. Taking the first book of the "*Wealth of Nations*," we can see that a large portion of its contents can be found in an undeveloped form in Petty's writings. This statement certainly holds good with regard to division of labor and the principle that occasions it, to price, to the rent of land. The three sources of national wealth are in one of Petty's tracts, the "*Verbum Sapienti*," distinguished with precision. Petty lays stress upon the distinction as being a valuable basis for improved taxation. It did not enter within his purpose to give this principle a wider application. Whatever Petty has said on the subject of money is so accurate and so penetrating that it is of great permanent value. Smith or any other writer can only follow in his footsteps, and repeat what he has already said in his clear and luminous treatment of currency in the "*Anatomy of Ireland*," in the "*Treatise on Taxes and Contributions*," and elsewhere. It is curious that Smith when he takes up interest approximates

to Petty's own definition, almost with verbal identity. I shall place the passages side by side:

SMITH.

"Interest is the compensation which the borrower pays to the lender for the profit which he has an opportunity of making by the use of the money." Bk. 1, ch. 6.

PETTY.

"Wherefore when a man giveth out his money upon condition that he may not demand it back until a certain time to come, he certainly may take a compensation for this inconvenience which he admits against himself" (34).

The canons of taxation prefixed to the fifth book are to be found either expressly stated or implicitly assumed in the "Treatise on Taxes," with the exception of the final one. As Petty followed Hobbes, and did not agree with Locke's conception of the limited sphere of government, which Smith adopted, we cannot expect a coincidence on this point. I think I can justify the general assertion by the following quotations: "Let the tax be never so great, if it be proportionable unto all, then no man suffers the loss of any riches by it" (17). "Ignorance of the numbers, wealth and trade of the people, causing a needless repetition of the charge" (5). "Another cause which aggravates taxes is the force of paying them in money at a certain time, and not in commodities at the most convenient seasons" (5). One of the causes of irregular taxing, he says in the "Verbum Sapienti," is "the opinion that certainty of rule is impossible" (482). A small but interesting resemblance between the two writers can be seen in the following passages:

Smith: "The rent of a house may be distinguished into two parts, of which the one may very properly be called the building rent, the other is commonly called the ground rent.

“The building rent is the interest or profit of the capital *expended* in building the house. * * * * This surplus rent [the second] is the price which the inhabitant of the house pays for some real or supposed *advantage* of the situation.” Bk. v, ch. ii.

Petty.—“An house is of a double nature, viz., one, wherein it is a way and means of *expence*, the other as it is an instrument and tool of *gain*” (26).

One is very open to errors in endeavoring to prove in a case of this sort that the later writer has copied his predecessor. Often when there is even greater similarity than in the above examples, the coincidence may be accidental. Smith did not recognize that the earlier writers whom he classed as mercantilists contained anything but false principles. At the present day it is possible to take a broader view without detracting from the fame of the “Wealth of Nations.” A place in the development of economic doctrine is conceded to Smith’s predecessors. Among them there is no one more worthy of recognition, no one whose place is more assured, than Petty. However imperfectly he is interpreted here, enough has been said to establish his claim to the respect and consideration of the students of economic literature.